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RAPID ASSESSMENT REPORT FOR SITE 29 BUILDING NH 46 ZONE C CNC CHARLESTON
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TETRA TECH

Rapid Assessment Report For Site 29, Building NH 46

Zone C Charleston Naval Complex North Charleston, South Carolina



**Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 0093**

January, 2000

**RAPID ASSESSMENT REPORT
FOR
SITE 29, BUILDING NH 46

ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:
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Naval Facilities Engineering Command
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North Charleston, South Carolina 29406**

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JANUARY 2000

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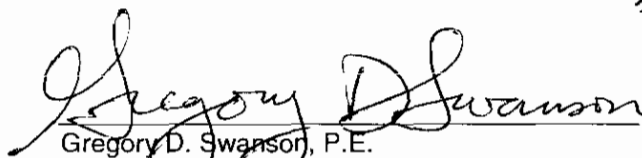
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CERTIFICATION PAGE

I certify that the information contained in this report and on any attachments is true, accurate, and complete to the best of my knowledge, information, and belief.



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1/24/00

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EXECUTIVE SUMMARY

Tetra Tech NUS, Inc. (TtNUS) has completed a Rapid Assessment (RA) for Site 29 (Building NH 46), a closed underground storage tank (UST) system at Charleston Naval Complex (CNC) Zone C, in North Charleston, South Carolina. The UST system provided fuel oil to Building NH 46. The RA was performed under the direction of the South Carolina Department of Health and Environmental Control (SCDHEC).

TtNUS performed the following actions during the RA:

- Reviewed available Navy documents to identify potential sources and receptors for petroleum hydrocarbons in the vicinity, evaluate public and private potable wells, locate utilities, locate nearby surface water bodies, and to determine surface hydrology and drainage;
- Reviewed the previously prepared Underground Storage Tank Assessment Report for UST NH46-5 to determine boring locations and monitoring well placements;
- Conducted a site survey to identify utilities, and to construct a site plan;
- Performed a direct push investigation collecting soil samples for field screening using an organic vapor analyzer, and collecting soil and groundwater samples for mobile lab screening analysis for benzene, toluene, ethyl benzene, total xylenes (BTEX), and diesel range organics;
- Installed 3 temporary piezometers;
- Installed 6 shallow permanent monitoring wells to approximately 16 feet below land surface (bls) and a vertical delineation well to approximately 41 feet bls;
- Collected groundwater samples from the permanent monitoring wells for laboratory analysis for BTEX, methyl tert-butyl ether (MTBE), and naphthalene using U.S. Environmental Protection Agency (USEPA) Method 8260 and polynuclear aromatic hydrocarbons (PAHs) using USEPA Method 8270;
- Performed groundwater natural attenuation sampling;
- Collected soil samples for laboratory analysis for BTEX, ethylene dibromide (EDB) and naphthalene using USEPA Method 8260, PAHs using USEPA Method 8270, total organic carbon (TOC) using USEPA Method 415.1, total recoverable petroleum hydrocarbon (TRPH) using USEPA Method 9071, and grain size analysis using sieve and hydrometer methods; and
- Surveyed monitoring well and piezometer top of casing elevations and collected depth to groundwater measurements to evaluate the groundwater flow direction.

Conclusion

Three groundwater-elevation monitoring events were conducted at Site 29 from July 27 through September 10, 1999. Free product was detected in monitoring well CNC29-M01 at product thickness of 0.81 feet and 1.12 feet during two of the groundwater monitoring events. Free product was not detected in any of the remaining wells. Groundwater samples for laboratory analysis were collected from the site monitoring wells in July and August, 1999. Groundwater samples were analyzed for BTEX, PAHs, and EDB. All groundwater CoCs were reported at less than laboratory detection limits and below their respective (SCDHEC's) Risk Based Screening Levels (RBSLs). The absence of free product in monitoring wells located in the vicinity of CNC29-MW01, and CoC parameters being reported below detection limits, has delineated the areal extent of free product and hydrocarbon impact to groundwater at Site 29.

Six soil samples (plus one duplicate sample) were collected on June 1 1999, and analyzed for BTEX, PAHs and EDB by a fix-based laboratory. Soil CoCs detected above SCDHEC's RBSLs included benzene at 9 micrograms per kilogram (ug/kg), ethylbenzene at 3,500 ug/kg, and naphthalene at 53,000 ug/kg. The benzene and naphthalene concentrations were detected in sample 29SLB050809 (boring CNC29-B05) at the north side of the former UST pit at 8- to -9 feet bls. The duplicate soil sample collected from the same interval (sample 29SLB050809D) contained the elevated ethylbenzene concentration. The RBSLs of 5 ug/kg for benzene, 1,260 ug/kg for ethylbenzene, and 210 ug/kg naphthalene, were established for the site based on soil boring log descriptions and grain size analysis which indicate a sandy soil matrix.

Groundwater RBSLs were calculated for benzene, toluene, and naphthalene using fuel oil constituents typical of kerosene, and Raoult's Law. Using Raoult's Law, benzene, toluene, and naphthalene concentrations were calculated at 0.31 mg/L, 4.65 mg/L, and 0.010 mg/L, respectively, in equilibrium with free product. These concentrations exceeded the RBSLs for benzene, toluene, and naphthalene established at 0.005 mg/L, 1.0 mg/L, and 0.010 mg/L, respectively. However, the Domenico model predicts that benzene, toluene, and naphthalene RBSLs will not migrate to the nearest surface water body, Noisette Creek, at levels above their RBSLs within 20 years.

The on-site construction worker (utility) was identified as a potential future receptor. The RBSLs for benzene, ethylbenzene, and naphthalene were evaluated for dermal, incidental ingestion, and inhalation exposures. Based on the RBSLs, Site-Specific Target Level (SSTL) were calculated for the subsurface soil for benzene, ethylbenzene, and naphthalene leaching to groundwater. The

soil leaching SSTL calculated for benzene is 1.2635 milligrams per kilogram (mg/kg), well above the maximum benzene concentration of 0.6 mg/kg. The soil leaching SSTL for ethylbenzene and naphthalene were 108 mg/kg and 245 mg/kg, respectively, and are greater than their maximum concentrations. The maximum soil concentrations of benzene, ethylbenzene and naphthalene found during the site assessment do not exceed their calculated SSTLs. Therefore, the construction worker is not at risk if exposed to groundwater by dermal contact, incidental ingestion, or inhalation.

Recommendation

Dissolved hydrocarbons at the source well (free product) are above the RBSLs, requiring corrective action according to SCDHEC guidelines, until such time as there is no longer any free product in well CNC-29-MW01. Active Corrective Action is recommended for Site 29 to achieve the Tier 2 SSTLs. Free product should be removed to the extent practicable pursuant to R.61-92, Section 280.64

1.0 INTRODUCTION

Site 29 is a closed underground storage tank (UST) system which provided fuel oil to Building NH 46 at the Charleston Naval Complex (CNC), Zone C in Charleston, South Carolina. This Rapid Assessment (RA) was performed by Tetra Tech NUS, Inc.'s (TtNUS's) Tallahassee, Florida, office, located at 1401 Oven Park Drive, Suite 102, Tallahassee, Florida 32312 (telephone number 850-385-9899) on behalf of the U.S. Navy Southern Division (SOUTHDIV) Naval Facilities Engineering Command (NAVFAC), 2155 Eagle Drive, North Charleston, South Carolina (telephone number 843-820-7307). Authorization to conduct the RA for the site was issued by NAVFAC under Contract Task Order (CTO) 0093. The RA was performed under the direction of the South Carolina Department of Health and Environmental Control (SCDHEC). Fieldwork necessary to complete the RA was performed May 13-15, June 1-29, July 2-27, and August 3-7, 1999, by TtNUS.

1.1 SITE DESCRIPTION

The CNC is in the city of North Charleston, on the west bank of the Cooper River in Charleston County, South Carolina, as shown on Figure 1. This installation consists of two major areas: an undeveloped dredge materials area on the east bank of the Cooper River on Daniel Island in Berkeley County, and a developed area on the west bank of the Cooper River. The developed portion of the base is on the peninsula bounded on the west by the Ashley River and on the east by the Cooper River. The site is located within the developed portion of the base as shown on Figure 2.

The area surrounding CNC is "mature urban," having long been developed with commercial, industrial, and residential land use. Commercial areas are primarily west of CNC; industrial areas are primarily to the north of the base along Shipyard Creek. A site vicinity map, which exhibits adjacent properties and structures, vicinity roads, current utilities, and vicinity surface drainage, is included as Figure 2.

Building NH 46 was constructed in 1941 and served as part of the Naval Hospital complex. The building's boilers and emergency generators utilized an UST system on the southwest side of the building, UST NH46-5, to provide fuel oil to the boilers and emergency generators (Figure 3). UST NH46-5 is a 1,500-gallon steel tank installed in 1941. It is unknown when the UST system was last in operation [Supervisor of Ship Building, Conversion and Repair, United States Navy, Portsmouth, Virginia, Environmental Detachment Charleston (SPORTENDEATCHASN), 1998].

1.2 SITE HISTORY

In 1901, the U.S. Navy acquired 2,250 acres near Charleston to build a shipyard and the first naval officer was assigned duty in early 1902. Subsequently, buildings and a dry dock were constructed in the Naval Yard. The dry dock was completed in 1909 along with several other brick buildings and the main power plant, which is still in operation today. The first ship was placed in dry dock and work began on fleet vessels in 1910. World War I brought about an expansion of the yards, facilities, land area, and work force. The yard built two gunboats, several submarine chasers, and tugs in addition to performing repairs and other services to the fleet. In 1933, building activity had increased principally in construction of several Coast Guard tugs, a Coast Guard cutter, and a Navy gunboat, creating the need for more facilities and a much larger work force. In 1943 civilian work force peaked with almost 26,000 employees divided among three daily shifts. In 1956, construction began on piers, barracks, and buildings for mine warfare ships and personnel. Later in the decade, the facility became a major home port for combatant ships and submarines of the U.S. Atlantic Fleet [Ensafe/Allan & Hoshall, Inc. (E/A&H), 1997].

In 1993, major cuts in defense spending, as a result in part to the end of the cold war, caused CNC to be added to the list of bases scheduled for closure under the Defense Base Realignment and Closure Act (BRAC). BRAC regulates the closure and transition of property back to the community (E/A&H, 1997). With the scheduled closure of the base, operations were scaled back and environmental cleanup proceeded to make the property available for redevelopment after closure. As part of the environmental cleanup process, the UST at Building NH46 was removed and the tank closure was completed September 22, 1998.

From August 1998 through September 22, 1998, UST NH46-5 was removed, cleaned, and recycled as scrap metal. At the time UST NH46-5 was removed, no pitting or holes were found in the tank or fuel distribution piping. Rust was observed on the outer tank wall but had not penetrated the tank's sheet metal. Rust was also observed throughout the entire fuel distribution piping run. A loose piping joint was identified approximately midway between the fill pipe inlet and UST46-5. The fuel supply and return line for UST NH46-5 consisted of 1/2-inch-diameter copper tubing which traveled below ground for a distance of approximately 26 feet into the southwest side of Building NH 46 (SPORTENDETHASN, 1998).

During the removal of UST46-5 the tank was accidentally punctured at 6 feet below land surface (bls) releasing approximately 50 gallons of fuel oil onto the soil. The soil impacted by the spill was excavated and placed in 55-gallon steel drums for disposal. No groundwater was encountered during the removal of UST46-5 system (SPORTENDETHASN, 1998).

During the removal of UST NH46-5, grab soil samples were obtained from the UST and piping excavations. Analytical results of the samples indicate reportable concentrations of benzene, toluene, ethylbenzene, and xylene (BTEX) and polynuclear aromatic hydrocarbon (PAH) compounds.); however, the detection limits for the samples were elevated due to matrix interference (SPORTENDETHASN, 1998). The Underground Storage Tank Assessment Report for UST NH46-5 is included in Appendix A.

1.3 RECEPTOR SURVEY RESULTS

A survey of the site vicinity was conducted by TtNUS personnel to identify potential receptors for petroleum hydrocarbon contamination. The site plan (Figure 2) depicts the public utilities located within 250 feet of the former UST NH46-5 study area. Specific information concerning the depth of utilities below land surface is currently unavailable. However, according to facility personnel, utility lines are typically located approximately 2 to 6 feet bls (SPORTENVDETHASN, 1999). The following utility receptors were located:

- Sanitary sewer, water utility: Sanitary sewer lines are located on the east and west sides of Building NH 46. These lines extend in a north to south orientation and enter Building NH 46 on the east side. The nearest downgradient (i.e.; in relationship to groundwater flow) sanitary sewer line is located approximately 90 feet northeast of UST NH46-5. Water utility lines are located to the north, south, and east of Building NH 46. The nearest downgradient water line is located approximately 120 feet east of UST NH46-5.
- Electrical utility, gas utility: A electrical line enters Building NH 46 on the southeast side and extends toward the east. The electrical line is located downgradient and approximately 100 feet east of UST NH46-5. A gas line is located northeast of Building NH 46. This gas line extends to the north and to the east at a junction point approximately 20 feet north of the northeast corner of Building NH 46.
- Storm drain utility: A storm drainage system is located on the west side of Building NH 46 near UST NH46-5. The storm drains for this system are located approximately 20 feet east and 60 feet north of UST NH46-5. Storm drainage systems are also located to the north, east, and southeast of Building NH 46.

According to the Final RCRA Facility Investigation Report for Zone H (E/A&H, 1996a) a survey of groundwater users within a 7-mile radius of CNC was conducted by the South Carolina Water Resources Commission to ascertain the extent of any shallow groundwater usage. Results of the water use investigation revealed that no drinking water wells, which utilize the shallow aquifer, are located within a

4-mile radius of CNC. Irrigation wells were not identified within 1,000 feet of the site. Numerous monitoring wells are located within 1,000 feet of the site. The nearest surface water body to UST NH46-5 is Noiset Creek located approximately 1,500 feet to the north. No basements are located on the CNC property (E/A&H, 1996a).

There are no city, county, or state zoning ordinances as the property (CNC) is currently owned by the federal government. Information concerning zoning ordinances was obtained from the SOUTHDIV Remedial Project Manager located at 2155 Eagle Drive, North Charleston, South Carolina 29406 (telephone number 843-820-7307).

1.4 REGIONAL GEOLOGY AND HYDROGEOLOGY

CNC is located in Charleston County, South Carolina, in the Lower South Carolina Coastal Plain Physiographic Province on the Cooper River side of the Charleston Peninsula. The peninsula is formed by the confluence of the Cooper and Ashley Rivers. Topography in the area is typical of the South Carolina lower coastal plain and is characterized by having low-relief plains broken by the meandering streams and rivers, flowing toward the coast past occasional marine terrace escarpments (E/A&H, 1997).

The geology of the Charleston area is typical of the southern Atlantic Coastal Plain. Cretaceous-age and younger sediments thicken seaward and are underlain by older igneous and metamorphic basement rock. Surface exposures consist of recent or Pleistocene sands, silts, and clays of high organic content referred to as the Wando Formation (E/A&H, 1997). Underlying the Wando Formation, increasing with age, are the Oligocene-age Cooper Group and the Eocene-age Santee Limestone. The Cooper Group is comprised of the Parkers Ferry, Ashley, and Harleyville Formations. The formation of particular importance in the Cooper Group is the Ashley Formation, which was formerly referred to as the Cooper Marl in most regional geologic literature. In more recent geologic nomenclature, the name "Cooper" has been given to a group of formations including the Ashley Formation, a pale green to olive-brown, sandy phosphoric limestone or marl, which is locally muddy and/or sandy. The Ashley Formation in the vicinity of Charleston is encountered at a depth of approximately 30 to 70 feet bls. The top of the Ashley Formation has been reported to be associated with an erosional basin and the entire Cooper Unit, including the Ashley Formation, is indicated to be approximately 300 feet thick (E/A&H, 1997).

Groundwater occurs under water table or poorly confined conditions within the Recent or Pleistocene deposits overlying the Ashley Formation of the Cooper Group. Transmissivity in the Pleistocene aquifer is generally less than 1,000 feet per day and well yields are variable, ranging from 0 to 200 gallons per

minute (gpm). This groundwater contains high concentrations of iron and is commonly acidic at shallow depths (E/A&H, 1997).

The Cooper Group is hydrogeologically significant mainly because of its low permeability. In most locales, its sandy, finely granular limestone produces little or no water, but instead acts as confining material causing artesian conditions in the underlying Santee Limestone. Yields from wells in the Santee are usually less than 300 gpm (E/A&H, 1997).

2.0 ASSESSMENT INFORMATION

2.1 SITE-SPECIFIC GEOLOGY AND HYDROGEOLOGY

2.1.1 Site Geology

Thirteen direct push soil borings were advanced at Site 29 under the supervision of a TtNUS geologist from May 13 through May 15, 1999 (Figure 3). Twelve borings were advanced to depths ranging from 12 feet bls to 16 feet bls and one boring was completed to a depth of 28 feet bls to provides soil samples to characterize the subsurface lithology. On June 16, 1999, five shallow monitoring wells were installed to a depth of 16 feet bls. During installation grab soil samples were collected to describe the subsurface lithology. On June 21 and July 2, 1999, a vertical delineation monitoring well was installed. During the drilling process, lithologic samples were collected using split-spoon samplers to characterize the subsurface lithology to a depth of 38 feet bls.

Based on lithologic descriptions from the soil borings, the subsurface soil generally consisted of sandy silt from near surface to depths ranging from 3 to 13 feet bls. Underlying the sandy silt are silty sand and sand deposits that are present to depths ranging from 20 to 28 feet bls. Clays with interbedded sands, and silty sands were encountered from 20 feet bls to 38 feet bls (Figures 4 and 5). Boring logs are presented in Appendix B.

2.1.2 Site Hydrogeology

Six shallow water table monitoring wells, CNC29-MW01, CNC29-MW02, CNC29-MW03, CNC29-MW04, CNC29-MW05 and CNC29-MW06, and one deep vertical delineation monitoring well, CNC29-MW07, were installed as part of this RA investigation (see Figure 3). The shallow monitoring wells were completed to a depth of 16.5 feet bls. Each shallow monitoring well was completed using 10 feet of 2-inch diameter, 0.01-inch machine-slotted Schedule 40 polyvinyl chloride (PVC) screen that bracketed the water table. Monitoring well CNC33-MW07 was completed as a Type III monitoring well with 6-inch-diameter PVC surface casing grouted to a depth of 20 feet bls. After the grout for the surface casing cured for 24 hours, the borehole was advanced to a depth of 41 feet and a 2-inch-diameter PVC monitoring well was installed with a 5-foot, 0.01-inch machine-slotted PVC screen. Well construction logs for the RA monitoring wells are presented in Appendix B. At the completion of the well installations, a South Carolina registered professional surveyor surveyed each monitoring well location and the top of casing elevation.

Three temporary, small diameter, PVC piezometer, were installed to determine the depth to groundwater beneath the site (see Figure 3). The piezometers were constructed of 1-inch diameter-Schedule 40 PVC threaded casing and well screen. The screen section of the piezometer was installed to bracket the water table.

Groundwater in shallow wells at Site 29 was encountered at depths ranging from approximately 9 to 11 feet bls during the RA investigation. The recorded water-level data collected during the RA are presented in Table 1. The groundwater elevation measurements for September 10, 1999, were used to evaluate the groundwater flow direction. Figure 6 presents the groundwater potentiometric surface recorded during the field event on September 10, 1999. The potentiometric surface maps depict a groundwater flow direction toward the east.

Groundwater level data collected in monitoring well CNC29-MW01 on July 27 and August 3, 1999 detected a free product thickness of 0.81 feet and 1.12 feet, respectively. Free product was not detected in monitoring wells CNC29-MW02, CNC29-MW03, and CNC 29-MW04, which are located to the south, west, and north of CNC29-MW01, respectively. The estimated areal extent of the free product is illustrated on Figure 7.

As part of the Final RCRA Facility Investigation Report for Zone B (E/A&H, 1996b), a tidal influence investigation was conducted to determine what effects tidal ranges in Noisette Creek and the Cooper River exhibit on groundwater flow within Zone B. The objective of the investigation was to measure water levels in the shallow aquifer during low, mid, and high tides in Zones A and B. Select wells in Zones C and E near the perimeter of Zone B were also measured to obtain additional data. Since Zone B is bordered by Noisette Creek to the north and is situated between Zone C and the Cooper River, results from the Zone B tidal influence investigation were used to evaluate effects of tidal influence on Site 29. Site 29 is located in Zone C of the RCRA Facility Investigation.

Measurements of tidal fluctuations identified that surface water elevations for Noisette Creek and the Cooper River varied greatly with tidal events; however, the tidal fluctuations produced less than 0.1 foot variations in all of the Zone B shallow wells. The results identified no significant change in groundwater flow direction in Zone B resulting from tidal fluctuations (E/A&H, 1996b). Since Site 29 is located farther inland from the Cooper River than the Zone B study area and farther inland to the Noisette Creek tributary, the impact of tidal fluctuation on the shallow groundwater flow direction at Site 29 is considered negligible.

2.2 ASSESSMENT RESULTS

Thirteen soil borings were completed as part of the screening portion of the soil investigation at Site 29. Six borings were completed to collect soil samples for analysis at a fixed base laboratory to confirm the Chemicals of Concern (CoC). The soil borings for screening evaluation were completed using a Direct Push Technology (DPT) rig. Samples were collected to evaluate subsurface soil vapors, soil contaminant concentration (via a mobile laboratory), and groundwater contaminant concentrations (via a mobile laboratory). The soil samples for organic vapor screening were collected from a maximum depth of 12 feet bls. The soil and groundwater samples collected for mobile laboratory screening were analyzed BTEX and diesel range organics.

Soil samples for CoC evaluation were collected on June 1, 1999, and analyzed for BTEX, ethylene dibromide (EDB) and naphthalene using U.S. Environmental Protection Agency (USEPA) Method 8260; and PAHs using USEPA Method 8270. One sample was collected for total organic carbon (TOC) analysis using USEPA Method 415.1, total recoverable petroleum hydrocarbons (TRPH) using USEPA Method 9071, and grain size analysis using sieve and hydrometer analysis. The sample collection was conducted in accordance with the SCDHEC guidance document *Standard Limited Assessment* (June 1997). Lithologic logs for each soil boring are presented in Appendix B. The soil boring locations are shown on Figure 3 and the assessment results are presented in Section 2.3.1.

Groundwater sampling was conducted on July 26, July 27, and August 7, 1999. Groundwater sampling was conducted using a peristaltic pump and low flow, quiescent techniques. The monitoring wells were sampled in accordance with SCDHEC's guidance document *South Carolina Risk-Based Corrective Action for Petroleum Releases* (January 1998). Each well was purged of three well volumes or until water quality parameters of pH, temperature, and conductivity stabilized. The field data sheets are included in Appendix C. A summary of the field parameter measurements is presented in Table 2. Groundwater samples were analyzed for BTEX, methyl tertiary butyl ether (MTBE), EDB, and naphthalene using USEPA Method 8260 and PAHs using USEPA Method 8270. Three of the groundwater samples were also analyzed for the following natural attenuation parameters: dissolved oxygen, alkalinity, carbon dioxide, sulfide, ferrous iron, nitrite, manganese, nitrogen/nitrate, sulfate and methane. Groundwater natural attenuation data are summarized on Table 3.

2.3 FIELD SCREENING ASSESSMENT

2.3.1 Soil Vapor Assessment

Thirteen soil borings were completed to evaluate for soil vapors as part of the soil screening assessment at Site 29. Organic vapor analyzer (OVA) headspace measurements were collected from vadose zone soils to evaluate the soil vapor concentrations. Table 4 summarizes the soil vapor screening results. Figure 3 presents the soil boring locations.

The highest soil vapor concentration was registered at 100 parts per million (ppm) in a soil sample collected from 8-9 feet bls at boring CNC29-B05. The soil vapor concentrations from the sample collected at 8 to 9 feet bls at CNC29-B05 (100 ppm) may reflect contamination associated with the groundwater or free product detected in CNC29-MW01 since low levels of soil vapors were detected in the samples from the remaining boring locations. Soil vapor concentrations in samples collected from remaining boring locations ranged from non detect (ND) to 7 ppm.

The soil vapor assessment was used as a screening method to assist in identifying locations for collection of soil samples and groundwater monitoring wells. Soil sample and monitoring well locations were determined, in part, based on these data.

2.3.2 Soil Mobile Laboratory Results

One soil sample collected from each soil boring was analyzed in a mobile laboratory for BTEX, naphthalene, and diesel range organics using USEPA Methods 8021B and 8015M. The soil samples were selected based on the soil vapor screening results with the additional criteria that the samples originate in the vadose zone above the water table. Table 5 presents a summary of the analytical data from the mobile laboratory. The boring locations are shown on Figure 3.

As indicated in Table 5, BTEX and naphthalene constituents were reported below the laboratory reporting limit in all samples except the one soil sample from CNC29-B05 where ethylbenzene [16 micrograms per kilogram (ug/kg)], total xylenes (70 ug/kg), and naphthalene (5,000 ug/kg) were detected. Diesel range organics were detected in 7 of the 13 soil samples. Six samples reported diesel range organics ranging in concentrations from 14 milligrams per kilogram (mg/kg) to 21 mg/kg. The soil sample from CNC29-B05 reported a diesel range organic concentration of 3,400 mg/kg.

The mobile laboratory soil analysis was used as a screening method to assist in identifying locations for collection of soil samples for fixed base laboratory analysis and locations for groundwater monitoring wells. Soil sample and monitoring well locations were determined in part based on these data.

2.3.3 Groundwater Mobile Laboratory Results

A groundwater sample was collected from each soil boring location and was analyzed by a mobile laboratory for BTEX, naphthalene, and diesel range organics using USEPA Methods 8021B and 8015M. Table 6 presents a summary of the analytical data from the mobile laboratory. The boring locations are shown on Figure 3.

As indicated in Table 6, BTEX constituents were reported below detection limits in groundwater samples collected from 10 of the 13 boring locations. The detected benzene concentrations ranged from 53 micrograms per liter (ug/L) to 86 ug/L, and toluene was detected at 8.1 ug/L, 8.3 ug/L, and 32 ug/L. Ethylbenzene concentrations ranged from 72 ug/L to 140 ug/L, and total xylenes concentrations ranged from 140 ug/L to 351 ug/L. Naphthalene concentrations were reported below detection limits in groundwater samples collected from 10 of 13 boring locations. Naphthalene concentrations of 33 ug/L, 600 ug/L, 700 ug/L and 4,000 ug/L were detected in the field screening groundwater samples. Diesel range organics were detected in several samples at concentrations from non detect to 4 milligrams per liter (mg/L).

The mobile laboratory groundwater analysis was used as a field screening method to assist in identifying locations for permanent groundwater monitoring wells. All detections noted above occurred at boring locations CNC29-B05, CNC29-B06, and CNC29-B12.

2.4 CHEMICALS OF CONCERN IN SOIL AND GROUNDWATER

2.4.1 Chemicals of Concern in Soil

Six subsurface soil samples (plus one duplicate sample) were collected from the Site 29 area for determination of CoCs. The soil boring locations are shown on Figure 3, and Table 7 summarizes the CoCs detected in the soil samples. COCs detected in the soil included benzene, toluene, ethylbenzene, total xylenes, and naphthalene. Benzene at 9 ug/kg and naphthalene at 50,300 ug/kg were detected in sample 29SLB050809 (boring CNC29-B05) at concentrations exceeding the Risk Based Screening Level (RBSL) of 5 ug/kg for benzene and 210 ug/kg for naphthalene in sandy soils. A duplicate sample, 29SLB050809D, also contained ethylbenzene (3,500 ug/kg) above the RBSL established at 1,260 ug/kg

for ethylbenzene. Benzene and naphthalene concentrations exceeding the RBSLs were also detected in the duplicate sample at 46 ug/kg and 22,400 ug/kg, respectively. The RBSL for sandy soil was used based on the boring log descriptions and a grain size analysis completed on sample 29SLB060809 (boring CNC29-B06) indicating a sandy soil matrix. Total organic carbon was also detected at 6,780 mg/kg in soil sample 29SLB060809. Soil analytical data sheets and grain size analysis reports are provided in Appendix D. The areal distribution of benzene, toluene, ethylbenzene, total xylenes, and naphthalenes from the June 1999 soil sampling are presented on Figures 8 through 12, respectively.

2.4.2 Chemicals of Concern in Groundwater

Table 8 presents the analytical results for CoCs detected in the groundwater samples. Groundwater analytical data sheets for the July 26, 27, and August 7, 1999, field events are presented in Appendix D. All groundwater CoC parameters were reported as less than laboratory detection limits and below their respective RBSLs.

2.5 ANALYTICAL DATA

Analytical data from the Underground Storage Tank Assessment Report (SPORTENDETHASN 1998) are presented in Appendix A. Soil analytical data generated during this RA are summarized in Table 7. Groundwater analytical data generated during this RA are summarized in Table 8. The soil and groundwater laboratory analytical data for this RA are included in Appendix D.

2.6 AQUIFER CHARACTERISTICS AND EVALUATION

Groundwater levels were measured from the site monitoring wells on September 10, 1999. The groundwater flow direction across the site is toward the east as illustrated on Figure 6. The hydraulic gradient on September 10 in the vicinity of CNC29-MW01 was 0.0555 feet per foot (ft/ft).

As part of the Final RCRA Facility Investigation Report for Zone C, rising and falling head slug tests were conducted on nine shallow monitoring wells throughout Zone C to determine the hydraulic conductivity of the surficial aquifer (E/A&H, 1997). Slug tests were conducted by instantaneously adding (falling head) or removing (rising head) a volume (slug) of water from the well and measuring the recovering water level with a data logger. A hydraulic conductivity value was then calculated for the rising head test and for the falling head test. The average hydraulic conductivity for each well was determined by calculating the geometric mean of the rising and falling head values. Because hydraulic conductivity data are

lognormally distributed, the geometric mean was determined to be the most representative measure of central tendency.

The well construction details and boring logs for each well tested during the RCRA investigation were reviewed to determine which wells were most representative of the conditions present at Site 29. To make this determination, the screened interval and proximity to the site were evaluated. Based on this evaluation, monitoring well NBCC047006 was selected as the most representative well. NBCC047006 is approximately 830 feet east-southeast of the site and is completed to a depth of approximately 13 feet with a 10-foot screened interval. The geometric mean of the rising and falling head conductivities for 047006 was 4.06 feet per day. The boring log showing the well completion and soil lithology for NBCC047006 is provided in Appendix E.

Potential movement of groundwater at the site may be described in terms of transportation by natural flow system in the saturated zone, assuming groundwater flow follows Darcy's Law. Using Darcy's Law the average linear velocity of groundwater may be expressed as:

$$V = \left(\frac{K}{n} \right) \times i$$

where:

V = average velocity

K = hydraulic conductivity = 4.06 ft/day

n = volumetric porosity = 0.47

Sieve test results for samples 29SLB060809 indicated that the soil was 98% sand, and therefore the charts on pages C3 through C5 were not applicable for estimating and soil porosity. The soil porosity default value of 0.47 cm³/cm³ given on page B2 in SCDHEC (1998) was used as the effective porosity value.

i = most recent hydraulic gradient measurement = 0.0555 ft/ft

therefore:

$$V = \left(\frac{4.06 \text{ ft/day}}{0.47} \right) \times 0.0555 \text{ ft/ft}$$

$$V = 0.479 \text{ ft/day}$$

In summary, the seepage velocity of the surficial aquifer was calculated to be approximately 175 feet per year based on a hydraulic conductivity of 4.06 feet per day, a hydraulic gradient of 0.0555 feet per foot, and a porosity of 47% for sandy soil.

2.7 FATE AND TRANSPORT MODEL DESCRIPTION

The Domenico model was the fate and transport model used to model groundwater in the risk analysis. The Domenico dilution/attenuation model is presented in the SCDHEC guidance document, *South Carolina Risk-Based Corrective Action for Petroleum Releases* (SCDHEC 1998). This model is very conservative in that it assumes an infinite mass, areal source condition through which groundwater flows. The model incorporates biological decay effects through a first-order decay process; however, this mechanism was ignored because SCDHEC guidance specifies that the decay rate must be assumed to be zero if site-specific decay rates have not been determined.

The impacted groundwater source area was modeled as 50 feet (15.00 m) wide and 6.56 feet (2.0 m) deep; these values are conservative defaults suggested by the *American Society for Testing and Materials (ASTM) Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* (ASTM 1997). The maximum source concentrations are assumed to exist throughout the source area, further compounding the conservatism of the estimate. Because of the existence of free product on-site, the maximum solubility in equilibrium with fuel oil, calculated using Raoult's Law, was used for the maximum constituent concentrations (see Appendix F). Fuel oil constituents can vary greatly but were assumed for this investigation to be similar to kerosene, which is typically 44% naphthalene (Conoco, Inc. 1996. CONCAWE Diesel Fuel/ Kerosene).

Site-specific data were used for saturated hydraulic conductivity, hydraulic gradient, and fraction of organic carbon in soil ($1.43\text{E-}05$ m/sec, 0.0555 ft/ft, and 0.00678 g-C/g-soil, respectively). The soil bulk density (1.45 g/cm³) and porosity (0.47 cm³/cm³) were the defaults given on page B2 in SCDHEC (1998) for sandy soil. Sieve test results for samples 29SLB060809 indicated that the soil was 98% sand, and, therefore, the charts on pages C3 through C5 were not applicable for estimating density and porosity.

The following estimates of dispersivity were used in the Domenico model as given in SCDHEC (1998):

Parameter	Estimate
Longitudinal Dispersivity, α_x	$x/10$, where x = distance between the point of exposure and the source or compliance point
Transverse Dispersivity, α_y	$\alpha_x/3$
Vertical Dispersivity, α_z	$\alpha_x/20$

Table 9 summarizes fate and transport parameters used in modeling.

2.8 PREDICTED MIGRATION AND ATTENUATION OF CHEMICALS OF CONCERN

The most recent groundwater-gauging event shows that groundwater flow is primarily to the east-northeast. The current extent of impact is limited to well CNC29-MW01, which contained free product in the latest sampling event. Figure 7 shows the areal extent of free product. Concentrations of compounds of interest in all other monitoring wells have been non-detect.

The Domenico model was used to predict the distance at which the leading edge of the plume is attenuated to RBSLs in 10 and 20 years without using degradation due to biological decay. This was done by adjusting the time to 10 years (3.15×10^8 sec) and 20 years (6.31×10^8 sec) and solving for distance (x) by trial and error. The source was assumed to be free product, that is the source concentration was assumed to be that of groundwater in equilibrium with fuel oil (see Section 2.6) for the entire 10- and 20- year periods. The distance was changed separately for benzene, toluene, and naphthalene until the required distance that is necessary for the concentration to attenuate to the RBSLs was determined. Only the calculated concentrations of benzene, toluene, and naphthalene at the source (in equilibrium with free product) were greater than their respective RBSLs; therefore these were the only chemicals for which plume distances were calculated. The model estimates that after 10 years, the concentrations of benzene, toluene, and naphthalene will be 0.005 mg/L, 1.0 mg/L, and 0.010 mg/L (i.e., the RBSLs) at distances of 430 feet, 127.2 feet, and 166 feet, respectively (Figure 13). Furthermore, after 20 years, the concentrations of benzene, toluene, and naphthalene is 0.005 mg/L, 1.0 mg/L, and 0.010 mg/L (RBSLs) at distances of 472 feet, 127.2 feet, and 288 feet, respectively (Figure 14). The nearest water body is Noisette Creek located approximately 1,500 feet north of the site. Regardless of groundwater flow direction, concentrations greater than the RBSLs for the CoCs would not migrate to Noisette Creek within 20 years. The Domenico 10-year and 20-year simulation spreadsheets are presented in Appendix F.

3.0 TIER 1 AND 2 EVALUATION

3.1 COMPARISON OF ANALYTICAL RESULTS WITH RBSLs

Soil samples were collected on June 1, 1999. The samples were analyzed for BTEX and PAHs including naphthalene. Benzene, ethylbenzene, and naphthalene were found at maximum concentrations above RBSLs for sandy soil less than 5 feet above groundwater. The maximum benzene concentration was 46 $\mu\text{g/kg}$; however, the detection limit in sample CNC29-B06 ($<600 \mu\text{g/kg}$) was above the RBSL for benzene of 5 $\mu\text{g/kg}$. Therefore, benzene was considered as a CoC with a maximum concentration of 600 $\mu\text{g/kg}$ in soil. The maximum concentrations of ethylbenzene and naphthalene were 3500 $\mu\text{g/kg}$ and 50,300 $\mu\text{g/kg}$, respectively.

Groundwater sampling was conducted on July 26-27, 1999. Free product (fuel oil) was present in CNC29-MW01 (Table 1). Free product was not detected in any of the remaining six wells. The remaining wells were sampled and analyzed for BTEX, MTBE, and PAHs including naphthalene. No contaminants of concern were detected in any well. It is noteworthy that no detections were found in the deep well, CNC29-MW07, located slightly downgradient of well CNC29-MW01. For concentrations in the well containing free product, CNC29-MW01, the maximum solubility in equilibrium with fuel oil was calculated using Raoult's Law. Fuel oil constituents can vary greatly but were assumed for this investigation to be similar to kerosene, which is typically 44% naphthalene. Results of the Raoult's Law calculations are located in Appendix F. Calculated concentrations for benzene, toluene, and naphthalene (0.31 mg/L, 4.65 mg/L, and 23.35 mg/L, respectively) in equilibrium with free product exceeded their RBSLs (0.005 mg/L, 1.0 mg/L, and 0.010 mg/L, respectively). A comparison of maximum soil and groundwater concentrations to RBSLs is summarized in Table 10.

3.2 SITE CONCEPTUAL EXPOSURE MODEL

This section focuses on the current and future land use issues concerning the site. The site is part of the former Naval Hospital Complex. Figure 1 shows that the site is located in and surrounded by the CNC. The area surrounding CNC is "mature urban," having long been developed with commercial, industrial, and residential land use. Commercial areas are primarily west of CNC; industrial areas are primarily to the north of the base along Shipyard Creek. This facility is included in the BRAC activities; therefore, the future use of the facility is unknown.

Drinking water at the site and surrounding properties is provided by the city of Charleston water treatment plants. The closest surface water body is Noiset Creek located approximately 1,500 feet north of the site. Potable wells and irrigation wells were not identified within 1,000 feet of the site (E/A&H 1996a). Numerous monitoring wells are located within 1,000 feet of the site (E/A&H 1996a). Groundwater at the site flows to the east-northeast.

3.3 EXPOSURE PATHWAY ANALYSIS

This section presents the receptor characterizations of the potentially exposed populations in the vicinity of the site and identifies the potentially complete exposure pathways for those receptors. SCDHEC requires that only those exposure pathways with CoC concentrations exceeding Tier 1 RBSL concentrations are examined in a Tier 2 Risk-Based Corrective Action Report. Tables 11 and 12 present the exposure pathway assessments for current and future use scenarios, respectively.

3.3.1 On-Site Commercial Worker

An on-site commercial worker is defined as an employee who works in a commercial capacity at the site. Commercial use of the site in the future is likely; therefore, an on-site commercial worker was considered as a potential receptor. Incidental ingestion, inhalation, and dermal contact with impacted soil are expected to be negligible for commercial workers because they are located inside a building and surficial soil was not impacted above RBSLs. Drinking water at this site is provided by the city; therefore, ingestion of groundwater is not a complete exposure pathway. The building foundation is assumed to be sufficient to prevent volatilization from both soil and groundwater into a commercial building, and there is no history of vapors in the commercial building. It is unlikely that any additional exposure pathways will exist for future on-site workers; therefore, no complete pathways exist for either current or future commercial workers.

3.3.2 On-Site Visitor

An on-site visitor is defined as any person other than a worker who might come on site. On-site visitors would have the same exposure pathways as commercial workers, but their exposure duration would be much shorter. This receptor does not have to be quantified because a potential on-site visitor's chemical intake would not drive risk or cleanup levels at the site.

3.3.3 On-Site Construction Worker

An on-site construction worker is defined as a laborer who would be involved in intrusive activities on or around the site, particularly in the area of subsurface utilities. On-site construction workers could be exposed to constituents in soil by the following pathways: inhalation of volatiles from soil, dermal contact with soil, and incidental ingestion of soil. On-site construction workers could be exposed to constituents in groundwater by the following pathways: inhalation of volatiles from groundwater, dermal contact with groundwater, and incidental ingestion of groundwater. Utilities lie in the immediate vicinity of the impacted area and this pathway was considered for soil and groundwater exposure to a utility worker.

3.3.4 On-Site Resident

An on-site resident is defined as any person making his or her home at the site. This site is expected to remain a commercial/industrial facility; therefore, the on-site resident receptor was not considered further.

3.3.5 Off-Site Resident

An off-site resident is defined as any person making his or her home near the site. This receptor's location is either an actual current residence near the site or is a vacant lot or property on which a residence could be built. The site is located in an area that will likely remain commercial/industrial, therefore, this potential receptor was not considered further.

3.3.6 Surface Water

Noisette Creek is located approximately 1,500 feet north of the site. Fate and transport modeling as presented in Section 2.8 showed the maximum distance a CoC would migrate from the source is 472 feet which is less than the distance to Noisette Creek. Therefore, Noisette Creek is not at risk due to the release at the site. No other surface water body lies within 1,000 feet of the site; therefore, this pathway was not considered further.

3.4 IDENTIFICATION OF DATA REQUIREMENTS

No additional data are required to calculate site specific target levels (SSTLs) for the site.

3.5 SITE-SPECIFIC TARGET LEVELS

The only identified future potential receptor is the construction (utility) worker. Site soil concentrations were compared with RBSLs for ingestion or dermal contact with surficial soil as shown in the following table. (Surficial soil was not impacted at the site; however, for the construction worker pathway, exposure to subsurface soil is evaluated as surface soil because the worker is expected to have direct contact with the subsurface soil.)

Chemical of Concern	Maximum Concentration (mg/kg)	RBSL for Ingestion or Dermal Contact with Soil - Commercial (mg/kg)	Exceed RBSL
Benzene	< 0.600	200	No
Ethylbenzene	3.5	200,000	No
Naphthalene	50.3	41,000	No

The maximum concentrations of CoCs detected when compared to the RBSLs, indicate the construction worker in a utility trench will not be at risk to the COC concentrations present in the site soil.

Groundwater RBSLs provided by SCDHEC are for ingestion only, therefore, RBSLs were calculated for the additional pathways of dermal contact, incidental ingestion, and inhalation of volatiles. A target cancer risk of 1×10^{-6} and a target hazard quotient of 1 were used in the calculations. Standard defaults were used when available and applicable to a construction worker. When no standard parameters were available, conservative assumptions were used. Where possible, site-specific parameters were used for site conditions. For all pathways, the exposure frequency was assumed to be 90 days/year and the exposure duration was assumed to be 1 year. These assumptions were considered conservative based on the nature of utility work.

The dermal contact RBSLs were calculated using the procedures in *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance* (USEPA Peer Consultation Workshop Draft, 1998). Based on expected limited contact with groundwater, the event frequency was assumed to be 1 event/day and the event duration was assumed to be 1 hour/event. The skin surface area available for contact was 4500 cm², based on one-fourth the skin surface area given in the risk assessment guidance document for a swimming adult.

The incidental ingestion RBSLs were calculated using the equation given in *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Interim Final)*, (USEPA 1989). An incidental ingestion rate of 0.01 L/day was assumed based on a fraction (12.5%) of the incidental ingestion rate for a wading adult (0.01 L/hr), considered for an 8-hour work day. The incidental ingestion rate for wading adults is given in *Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment* (USEPA Region 4 1995).

Utility lines in the area are typically 2 to 6 feet deep. The depth to groundwater at the site ranges from 8.03 to 11.59 feet bgs, slightly below the estimated depth of the utility lines. As utility work can be expected to excavate a few feet below the line, this pathway was considered complete. It was assumed that a construction worker might be exposed to chemicals volatilizing from standing groundwater. The inhalation RBSLs were calculated using Henry's Law:

$$RBSL_{\text{WATER}} = RBSL_{\text{AIR}}/H$$

Where H = Henry's Law constant [mg/L-air/mg/L-water]

The $RBSL_{\text{AIR}}$ for each chemical was calculated using the equation given in the *American Society for Testing and Materials ASTM Standard Guide for Risk-Based Corrective Action Applied to Petroleum Release Sites*, Designation E 1739-95e1 (1997). SCDHEC values were used for Henry's Law constants.

The minimum RBSL for the three pathways was chosen as the RBSL for the construction worker. The following table shows the calculated RBSLs for each pathway along with the selected (minimum) RBSL:

	Dermal RBSL	Incidental Ingestion RBSL	Inhalation RBSL	Selected (Minimum) RBSL	Maximum Site Concentration	Exceed RBSL
	mg/L	mg/L	mg/L	mg/L	mg/L	
Benzene	0.85	68.52	0.15	0.15	0.31	Yes
Toluene	23.98	5677.78	5.19	5.19	4.65	No
Ethylbenzene	6.05	2838.89	14.70	6.05	0.10	No
Xylenes	102.33	56777.78	102.12	102.12	0.79	No
Naphthalene	1.63	1135.56	2.63	1.63	23.35	Yes

Appendix G provides the parameters and results of the RBSL calculations.

In addition, the SCDHEC Soil Leachability Model was used to determine soil SSTLs for benzene, ethylbenzene, and naphthalene protective of groundwater exposure for a construction worker. Site-specific data were used for total petroleum hydrocarbon (TPH), percent of soil that is sand or clay, fraction of organic carbon in soil, distance from highest soil impact to water table, and hydraulic conductivity (261 mg/kg, 98% sand, 1% clay, 6780 mg-C/kg-soil, 50 cm, 1.43E-03 cm/sec, respectively). The soil bulk density (1.45 g/cm³), annual average recharge (25 cm), wetting front suction (10 cm), porosity (0.47 cm³/cm³), and residual water content (0.04) were the defaults given on page B2 in SCDHEC (1998). Sieve test results for samples 29SLB060809 indicated that the soil was 98% sand and, therefore, the charts on pages C3 through C5 were not applicable for estimating density and porosity.

The groundwater RBSLs used in the leachability calculations were those calculated above for construction worker exposure. The soil leaching SSTL calculated for benzene was 1.2635 mg/kg, which is above the maximum benzene concentration detected (0.600 mg/kg). In addition, the SSTLs for ethylbenzene and naphthalene were 108 mg/kg and 245 mg/kg, respectively, and were also greater than their respective maximum concentrations.

Soil concentrations and calculated SSTLs were:

Chemical of Concern	Source Area Concentration [mg/kg]	SSTL (mg/kg)	Exceed SSTL
Benzene	0.6	1.2635	No
Ethylbenzene	3.5	108	No
Naphthalene	50.3	245	No

Appendix H provides the leachability model calculations generating SSTLs.

Since the maximum soil concentrations of benzene, ethylbenzene, and naphthalene (0.6 mg/kg, 3.5 mg/kg, and 50.3 mg/kg, respectively) found during the site assessment does not exceed the calculated SSTL for benzene, ethylbenzene, or naphthalene (1.2635 mg/kg, 108 mg/kg, and 245 mg/kg, respectively), the construction worker is not at risk if exposed to groundwater by dermal contact, incidental ingestion, or inhalation regardless of downgradient distance from source. The concentrations of benzene or naphthalene in the groundwater resulting from leaching from the soil to the groundwater will not exceed the RBSLs for a construction worker in a utility trench (0.15 mg/L, 6.05 mg/L, or 1.63 mg/L, respectively). This potential receptor is considered non-threatening and further analysis is unnecessary.

3.6 RECOMMENDATIONS

The extent of hydrocarbon impact to soil has been delineated. The maximum soil concentrations of all CoCs do not exceed their respective RBSLs for ingestion and dermal contact with soil nor do they exceed the calculated SSTLs protective of leaching to groundwater and affecting a construction worker exposed in a nearby utility trench.

The downgradient extent of hydrocarbon impact to groundwater has been delineated. There has historically been free product in CNC29-MW01. The calculated concentrations of benzene and naphthalene at the source well CNC29-MW01 (0.31 mg/L and 23.35 mg/L, respectively) in groundwater in equilibrium with fuel oil exceed the RBSLs for benzene and naphthalene (0.15 mg/L and 1.63 mg/L, respectively) calculated in Section 3.5 for exposure by a utility worker.

Since the dissolved hydrocarbon concentrations at the source well are above the RBSLs, corrective action is required according to SCDHEC guidelines, until such time as there is no longer any free product in well CNC29-MW01 and the benzene and naphthalene concentrations fall below the RBSLs of 0.15 mg/L and 1.63 mg/L, respectively.

Active Corrective Action is recommended for Site 29 to achieve Tier 2 SSTLs. Free product should be removed to the extent practicable pursuant to R.61-92, Section 280.64.

4.0 REFERENCES

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TABLE 1

**GROUNDWATER ELEVATIONS
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL BASE COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Well No.	Total Depth of Well (ft)	Top of Casing Elevation, ft (MSL)	Date Measured	Depth to Free Product (BTOC)	Product Thickness, ft	Depth to Water, ft (BTOC)	Groundwater Elevation, ft (MSL)
CNC29-MW01	16.5	20.88	7/27/99	NR	0.81	NR	NA
			8/3/99	10.11	1.12	11.23	9.65
			9/10/99	ND	ND	11.59	9.29
CNC29-MW02	16.5	21.59	7/26/99	ND	ND	10.66	10.93
			9/10/99	ND	ND	11.09	10.50
CNC29-MW03	16.5	20.81	7/27/99	ND	ND	9.47	11.34
			9/10/99	ND	ND	9.93	10.88
CNC29-MW04	16.5	20.70	7/26/99	ND	ND	9.95	10.75
			9/10/99	ND	ND	10.45	10.25
CNC29-MW05	16.5	20.32	7/26/99	ND	ND	9.67	10.65
			9/10/99	ND	ND	10.23	10.09
CNC29-MW06	16.5	20.10	8/7/99	ND	ND	9.67	10.43
			9/10/99	ND	ND	10.20	9.90
CNC29-MW07	41.0	20.57	7/27/99	ND	ND	8.03	12.54
			9/10/99	ND	ND	8.62	11.95

*es:

MSL - Mean Sea Level
BTOC - Below Top of Casing
ft - feet
ND - Not Detected
NR - Not Recorded
NA - Not Available

TABLE 2

**GROUNDWATER FIELD MEASUREMENTS
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Well I.D.	Date Sampled	Purge method	Volume (gallons)	Temp. (° C)	pH	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/l)
CNC29-MW02	07/26/99	PP	2.0	26.8	5.06	0.064	0	2.92
CNC29-MW03	07/27/99	PP	3.4	26.6	5.80	0.061	0	2.61
CNC29-MW04	07/26/99	PP	2.1	27.4	5.65	0.068	0	2.91
CNC29-MW05	07/26/99	PP	2.2	27.7	5.67	0.080	0	1.72
CNC29-MW06	08/07/99	PP	3.3	27.5	5.95	0.09	6	1.87
CNC29-MW07	07/27/99	PP	18.3	26.8	8.15	0.23	40	1.84

Notes:

(° C) - Degrees Celsius

PP - Peristaltic pump, low flow technique

uMHOS/cm - Micro HOS per centimeter

NTU - Nephelometric turbidity units

mg/l - Milligrams per liter

TABLE 3

**GROUNDWATER NATURAL ATTENUATION FIELD MEASUREMENTS
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Well I.D.	Date Sampled	Dissolved Oxygen (mg/L)	Alkalinity (mg/L)	Carbon Dioxide (mg/L)	Sulfide (mg/L)	Hydrogen Sulfide (mg/L)	Ferrous Iron (mg/L)	Nitrite (mg/L)	Manganese (mg/L)	Nitrogen/Nitrate (mg/L)*	Sulfate (mg/L)*	Methane (ug/L)*
CNC29-MW03	7/27/99	2.0	16	41	0.03	Not analyzed	0.01	0.025	Not analyzed	0.066	8.60	<5.2
CNC30-MW01	8/22/99	0.4	45	88	0.80	5.0	0.21	0.003	0.2	< 0.05	1.20	9,200
CNC30-MW05	8/22/99	0.4	11	34	0.01	0.0	0.81	0.010	0.0	0.790	33.00	7

Notes:

mg/L - Milligrams per liter

ug/L - Micrograms per liter

E- Estimated Concentration

* Fixed base laboratory analysis

TABLE 4

**SUMMARY OF OVA SOIL SCREENING RESULTS
SITE 29, BUILDING NH 46
ZONE C, FORMER CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Sample Location	Sample Depth (feet)	Total Organic Vapor Headspace Concentration
CNC29-B01	1-2	2
	2-3	2
	3-4	2
	4-5	2
	8-9	2
CNC29-B02	4-5	4
	7-8	4
	8-9	4
CNC29-B03	7-8	7
CNC29-B04	2-3	4
	3-4	4
	5-6	4
	7-8	4
CNC29-B05	2-3	3.5
	3-4	3.5
	5-6	4
	8-9	100
	9-10	10
CNC29-B06	2-3	4
	3-4	4
	4-5	4
	5-6	4
	6-7	4
	7-8	4
	8-9	7
CNC29-B07	3-4	2
	6-7	2
	7-8	7
CNC29-B08	2-3	4
	3-4	4
	5-6	4
	6-7	4
	7-8	4
	8-9	4
	9-10	4
CNC29-B09	1-2	4
	2-3	4
	3-4	4
	4-5	4
	5-6	4
	6-7	4
	7-8	4
	8-9	4
	9-10	4

TABLE 4 (Continued)

**SUMMARY OF OVA SOIL SCREENING RESULTS
SITE 29, BUILDING NH 46
ZONE C, FORMER CHARLESOTN NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Sample Location	Sample Depth (feet)	Total Organic Vapor Headspace Concentration
CNC29-B10	3-4	4
	5-6	4
	6-7	4
	8-9	4
	9-10	4
	11-12	4
CNC29-B11	2-3	4
	3-4	4
	5-6	4
	6-7	4
	7-8	4
	8-9	4
CNC29-B12	9-10	4
	2-3	4
	3-4	4
	5-6	4
	6-7	4
	7-8	4
	8-9	4
	9-10	4
CNC29-B13	2-3	3
	3-4	3
	4-5	3
	5-6	3
	6-7	3
	7-8	3
	8-9	3

Note:

OVA - organic vapor analyzer equipped with a flame ionization detector

TABLE 5

**SUMMARY OF MOBILE LABORATORY SCREENING RESULTS FOR SOIL
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Sample Location	Sample Identification	Sample Depth (feet)	Mobile Laboratory Screening Data ⁽¹⁾					
			Benzene (ug/kg)	Toluene (ug/kg)	Ethylbenzene (ug/kg)	Total Xylenes (ug/kg)	Naphthalene (ug/kg)	Diesel Range Organics (mg/kg)
CNC29-B01	29SFB01-0708	7-8	<5.0	<5.0	<5.0	<5.0	<5.0	14
CNC29-B02	29SFB02-0708	7-8	<5.0	<5.0	<5.0	<5.0	<5.0	15
CNC29-B03	29SFB03-0708	7-8	<5.0	<5.0	<5.0	<5.0	<5.0	26
CNC29-B04	29SFB04-0708	7-8	<5.0	<5.0	<5.0	<5.0	<5.0	19
CNC29-B05	29SFB05-0809	8-9	<5.0	<5.0	16	70	5000	3400
CNC29-B06	29SFB06-0809	8-9	<5.0	<5.0	<5.0	<5.0	<5.0	21
CNC29-B07	29SFB07-0708	7-8	<5.0	<5.0	<5.0	<5.0	<5.0	19
CNC29-B08	29SFB08-0708	7-8	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC29-B09	29SFB09-0708	7-8	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC29-B10	29SFB10-1112	11-12	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC29-B11	29SFB11-0708	7-8	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC29-B12	29SFB12-0708	7-8	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC29-B13	29SFB13-0708	7-8	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC29-B13	29SFB13-0708 ⁽²⁾	7-8	NA	NA	NA	NA	NA	<10

NOTES:

⁽¹⁾ Mobile laboratory screening data were analyzed using USEPA Method 8021/8015M. Compounds not detected are reported as less than the instrument detection limit.

⁽²⁾ Laboratory duplicate

NA Not analyzed

ug/kg Micrograms per kilogram

mg/kg Milligrams per kilogram

TABLE 6

**SUMMARY OF MOBILE LABORATORY SCREENING RESULTS FOR GROUNDWATER
SITE 29, BUILDING NH 46
ZONE C, FORMER CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Sample Location	Sample Identification	Laboratory Screening Data ⁽¹⁾					
		Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)	Naphthalene (ug/L)	Diesel Range Organics (mg/L)
CNC29-B01	29GFB01-12	<1.0	<1.0	<1.0	<1.0	33	<0.1
CNC29-B02	29GFB02-12	<1.0	<1.0	<1.0	<1.0	<1.0	0.2
CNC29-B03	29GFB03-12	<1.0	<1.0	<1.0	<1.0	<1.0	0.1
CNC29-B04	29GFB04-12	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1
CNC29-B05	29GFB05-12	86	32	130	280	600	2.3
CNC29-B06	29GFB06-12	61	8.1	91	140	600	0.8
CNC29-B06	29GFDB06-12 ⁽²⁾	75	8.3	140	201	700	NA
CNC29-B07	29GFB07-12	<1.0	<1.0	<1.0	<1.0	<1.0	0.2
CNC29-B08	29GFB08-12	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1
CNC29-B09	29GFB09-12	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1
CNC29-B10	29GFB10-16	<1.0	<1.0	<1.0	<1.0	<1.0	0.1
CNC29-B11	29GFB11-12	<1.0	<1.0	<1.0	<1.0	<1.0	0.1
CNC29-B12	29GFB12-14	53	<1.0	72	351	4000	4.0
CNC29-B13	29GFB13-12	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1

NOTES:

⁽¹⁾ Laboratory screening data were analyzed using USEPA Method 8020/8015M. Compounds not detected are reported as less than the instrument detection limit.

⁽²⁾ Laboratory duplicate

NA Not analyzed

ug/L Micrograms per liter

mg/L Milligrams per liter

TABLE 7

**SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN SOIL
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Soil Boring / Sample No.	Sample Date	Benzene (ug/kg)	Toluene (ug/kg)	Ethyl- benzene (ug/kg)	Xylenes (total) (ug/kg)	Benzo(a) anthracene (ug/kg)	Benzo(b) fluoranthene (ug/kg)	Benzo(k) fluoranthene (ug/kg)	Chrysene (ug/kg)	Dibenzo(a,h) anthracene (ug/kg)	Naphthalene (ug/kg)
RBSL ⁽¹⁾		5	1622	1260	42471	73084	29097	231109	12998	87866	210
CNC29-B04 / 29SLB040708	1-Jun-99	< 6	< 6	< 6	< 6	< 360	< 360	< 360	< 360	< 360	< 6
CNC29-B05 / 29SLB050809	1-Jun-99	9	120	1200	3400	< 6900	< 6900	< 6900	< 6900	< 6900	50300
CNC29-B05 / 29SLB050809D	1-Jun-99	46	260	3500	9000	< 360	< 360	< 360	< 360	< 360	22400
CNC29-B06 / 29SLB060809	1-Jun-99	< 600	< 600	< 600	< 600	< 360	< 360	< 360	< 360	< 360	< 600
CNC29-B07 / 29SLB070708	1-Jun-99	< 6	< 6	< 6	< 6	< 360	< 360	< 360	< 360	< 360	< 6
CNC29-B11 / 29SLB110708	1-Jun-99	< 7	< 7	< 7	< 7	< 330	< 330	< 330	< 330	< 330	4 ^(J)
CNC29-B12 / 29SLB120708	1-Jun-99	< 6	< 6	< 6	< 6	< 360	< 360	< 360	< 360	< 360	< 6
CNC29-TL / 29TL00301 ⁽²⁾	1-Jun-99	< 5	< 5	< 5	< 5	NA	NA	NA	NA	NA	< 5

All concentrations are in micrograms per kilograms (ug/kg).

NA - Not Analyzed

⁽¹⁾ South Carolina Department of Health and Environmental Control Risk Based Screening Levels for sandy soils; depth to groundwater less than 5 feet.

⁽²⁾ Trip blank

^(J) Indicates the presence of an analyte at a concentration less than the reporting limit and greater than the detection limit.

TABLE 8

**SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN GROUNDWATER
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Monitoring Well/ Sample No.	Sample Date	Benzene (ug/L)	Ethyl- benzene (ug/L)	Toluene (ug/L)	Xylenes (total) (ug/L)	MTBE (ug/L)	Naphthalene (ug/L)	Benzo(a) anthracene (ug/L)	Benzo(b) fluoranthene (ug/L)	Benzo(k) fluoranthene (ug/L)	Chrysene (ug/L)	Dibenzo(a,h) anthracene (ug/L)
RBSL ⁽¹⁾		5	700	1000	10000	40	10 ⁽²⁾	10 ⁽²⁾	10 ⁽²⁾	10 ⁽²⁾	10 ⁽²⁾	10 ⁽²⁾
CNC29-MW01	26-Jul-99	310 ⁽³⁾	100 ⁽³⁾	4650 ⁽³⁾	790 ⁽³⁾	-	23350 ⁽³⁾	-	-	-	-	-
CNC29-MW02 / 29GLM0201	26-Jul-99	< 5	< 5	< 5	< 5	< 5	< 5	<10	<10	<10	<10	<10
CNC29-MW03 / 29GLM0301	27-Jul-99	< 5	< 5	< 5	< 5	< 5	< 5	<10	<10	<10	<10	<10
CNC29-MW04 / 29GLM0401	26-Jul-99	< 5	< 5	< 5	< 5	< 5	< 5	<10	<10	<10	<10	<10
CNC29-MW04 / 29GLM0401D	26-Jul-99	< 5	< 5	< 5	< 5	< 5	< 5	<10	<10	<10	<10	<10
CNC29-MW05 / 29GLM0501	26-Jul-99	< 5	< 5	< 5	< 5	< 5	< 5	<10	<10	<10	<10	<10
CNC29-MW06 / 29GLM0601	7-Aug-99	< 5	< 5	< 5	< 5	< 5	< 5	<10	<10	<10	<10	<10
CNC29-MW07 / 29GLM0701	27-Jul-99	< 5	< 5	< 5	< 5	< 5	< 5	<10	<10	<10	<10	<10
CNC29TL ⁽⁴⁾ / 29TL00901	27-Jul-99	< 5	< 5	< 5	< 5	< 5	< 5	NA	NA	NA	NA	NA

All concentrations are in ug/L.

ND - Not detected.

NA - Not analyzed

⁽¹⁾ South Carolina Department of Health and Environmental Control Risk Based Screening Levels for ground water.

⁽²⁾ The Risk based screening level for individual PAH CoC is 10 ug/L or 25 ug/L for total PAHs.

⁽³⁾ Concentrations in equilibrium with free product as calculated by Raoult's Law (See Appendix G)

⁽⁴⁾ Trip blank

⁽⁵⁾ Indicates presence of analyte at a concentration less than the reporting limit and greater than the detection limit.

TABLE 9

**FATE AND TRANSPORT INPUT PARAMETERS
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Parameter	Domenico Dilution/Attenuation Model ⁽¹⁾
Hydraulic Conductivity [m/sec]	1.43E-05
Hydraulic Gradient	0.0055
Porosity ^(a)	0.47
Estimated Plume Length [ft]	NA
Soil Bulk Density ^(a) [kg/L]	1.45
Fractional Organic Carbon	6.78E-03
First Order Decay Rate ^(a) [sec ⁻¹]	0
Modeled Plume Length [ft]	NA
Modeled Plume Width [ft]	NA
Source Width ^(b) [m]	15
Source Thickness ^(b) [m]	2
Soluble Mass [kg]	Infinite ^(c)

(1) - *South Carolina Risk-Based Corrective Action for Petroleum Releases*,
South Carolina Department of Health and Environmental Control, 1998.

(a) - Stated values are default values for sandy soil.

(b) - Values determined from American Society for Testing and Materials (ASTM)
Standard Guide for RISK Based Corrective Action Applied at Petroleum Sites, 1997

(c) - Assumption of the Domenico Model

TABLE 10

**COMPARISON OF MAXIMUM CONCENTRATIONS TO RBSLs
SITE 29, BUILDING NH46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Chemical of Concern	Maximum Concentration (Soil) (mg/kg)	RBSLs Soil (mg/kg) ^(a)	Maximum Concentration GW (mg/L)	RBSLs GW (mg/L) ^(b)
Benzene	< 0.600	0.005	0.31	0.005
Toluene	< 0.600	1.622	4.65	1
Ethylbenzene	3.5	1.26	0.1	0.7
Xylenes	9	42.471	0.79	10
MTBE	NA	NA	NA	0.04
Naphthalene	50.3	0.21	23.35	0.010

(a) - From Risk-Based Corrective Action for Petroleum Releases, Table 4, Depth to GW - <5 ft, SCDHEC RBCA Guidelines, 1998.

(b) - From Risk-Based Corrective Action for Petroleum Releases, Table B1, SCDHEC RBCA Guidelines, 1998.

GW - Groundwater

RBSLs - Risk Based Screening Levels

Shaded cell indicates the concentration exceeded the RBSL.

TABLE 11

**EXPOSURE PATHWAY ASSESSMENT - CURRENT LAND USE
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Media	Exposure Route	Pathway Selected for Evaluation? (Yes or No)	Exposure point or Reason for Non-Selection	Data Requirements (If pathway selected)
Air	Inhalation	No	Area of Building NH 46 below grade is above water table and not expected to act as a basement. Foundation of building assumed as a vapor barrier. No explosion hazard.	
	Explosion Hazard	No		
Groundwater	Ingestion	No	No current groundwater pathways completed. Drinking water provided by city.	
	Dermal contact	No		
	Inhalation	No		
Surface Water	Ingestion	No	No surface water bodies within 1,000 feet	
	Dermal contact	No		
	Inhalation	No		
Surficial Soil	Ingestion	No	No surficial soil impact.	
	Dermal contact	No		
	Inhalation	No		
Subsurface Soil	Ingestion	No	No current complete pathways.	
	Dermal contact	No		
	Inhalation	No		

TABLE 12

**EXPOSURE PATHWAY ASSESSMENT – FUTURE LAND USE
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Media	Exposure Route	Pathway Selected for Evaluation? (Yes or No)	Exposure point or Reason for Non-Selection	Data Requirements (If pathway selected)
Air	Inhalation	No	Area of Building NH 46 below grade is above water table and not expected to act as a basement. Foundation of building assumed as a vapor barrier. No explosion hazard.	
	Explosion Hazard	No		
Groundwater	Ingestion	Yes	Groundwater exposure by potential construction worker (most likely in utility corridor). Both direct exposure and exposure by soil leaching to groundwater evaluated. Potential for volatilization and inhalation.	No additional data needed.
	Dermal contact	Yes		
	Inhalation	Yes		
Surface Water	Ingestion	No	No surface water bodies within 1,000 feet	
	Dermal contact	No		
	Inhalation	No		
Surficial Soil	Ingestion	No	Soil exposure by potential construction worker (most likely in utility corridor). Although there is no surficial soil impact, subsurface soil evaluated as surface soil for construction worker as direct contact likely in utility trench.	No additional data needed.
	Dermal contact	No		
	Inhalation	No		
Subsurface Soil	Ingestion	YES	Soil exposure by potential construction worker (most likely in utility corridor). Soil leaching to groundwater provides exposure pathway.	
	Dermal contact	YES		
	Inhalation	YES		

[illegible]

A horizontal scale bar with alternating black and white segments. It is marked with '0' at the left end, '2000' in the middle, and '4000' at the right end. Below the bar, the text 'SCALE IN FEET' is centered.

DRAWN BY		DATE	
HJP		8/20/99	
CHECKED BY		DATE	
COST/SCHED-AREA			
SCALE			
AS NOTED			



**SITE LOCATION MAP
SITE 29, BUILDING NH48-5, ZONE C
CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SC**

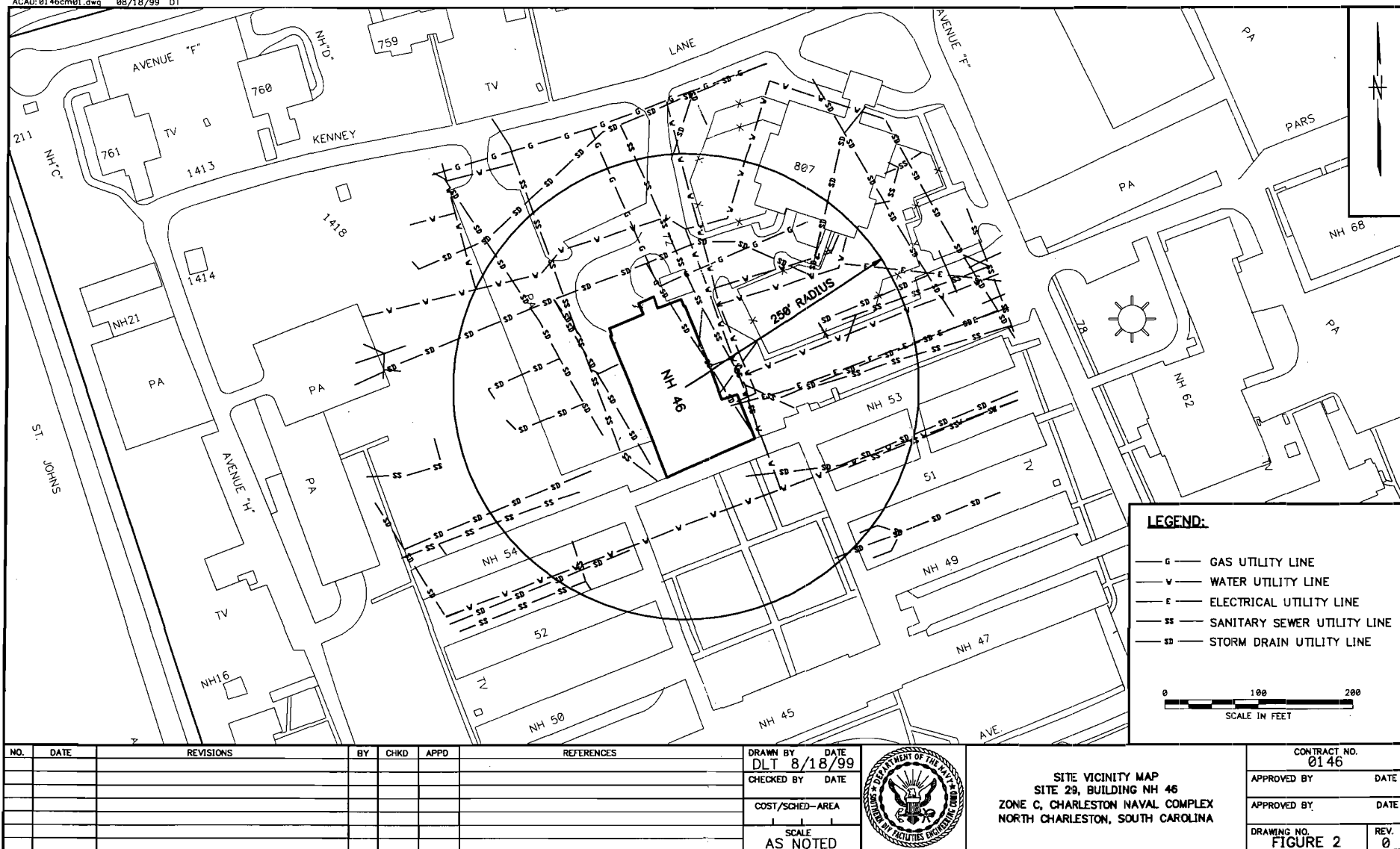
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N0164

APPROVED BY	DATE
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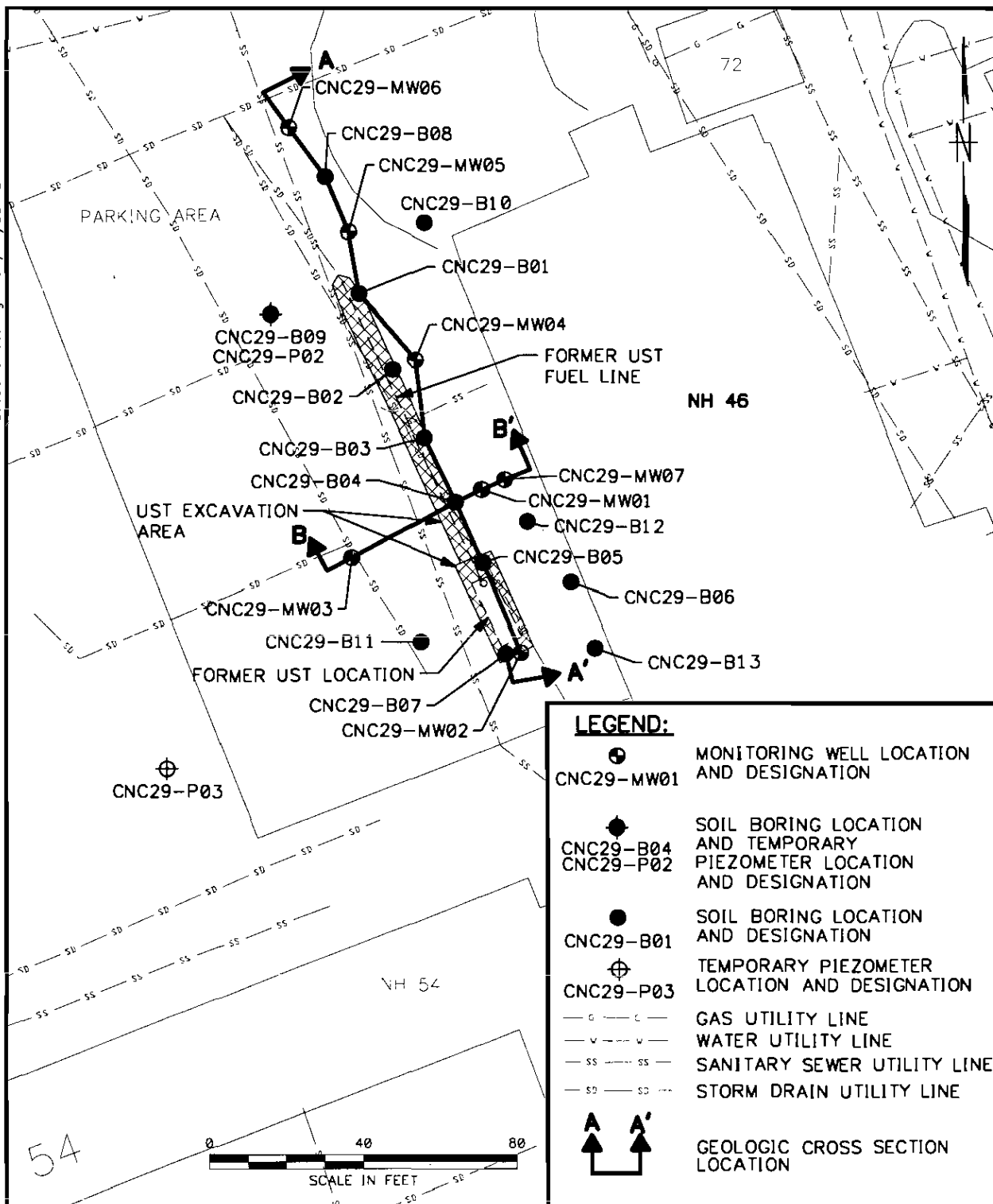
APPROVED BY	DATE
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DRAWING NO. FIGURE 1	REV. 0
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FORM CADD NO. SDTV_AV.DWG - REV 0 - 1/20/98



ACAD:0164CH09.dwg 10/20/99 DT



DRAWN BY DATE

DLT 10/20/99

CHECKED BY DATE

COST/SCHED-AREA

SCALE
AS NOTED



SITE MAP AND SAMPLING LOCATIONS
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

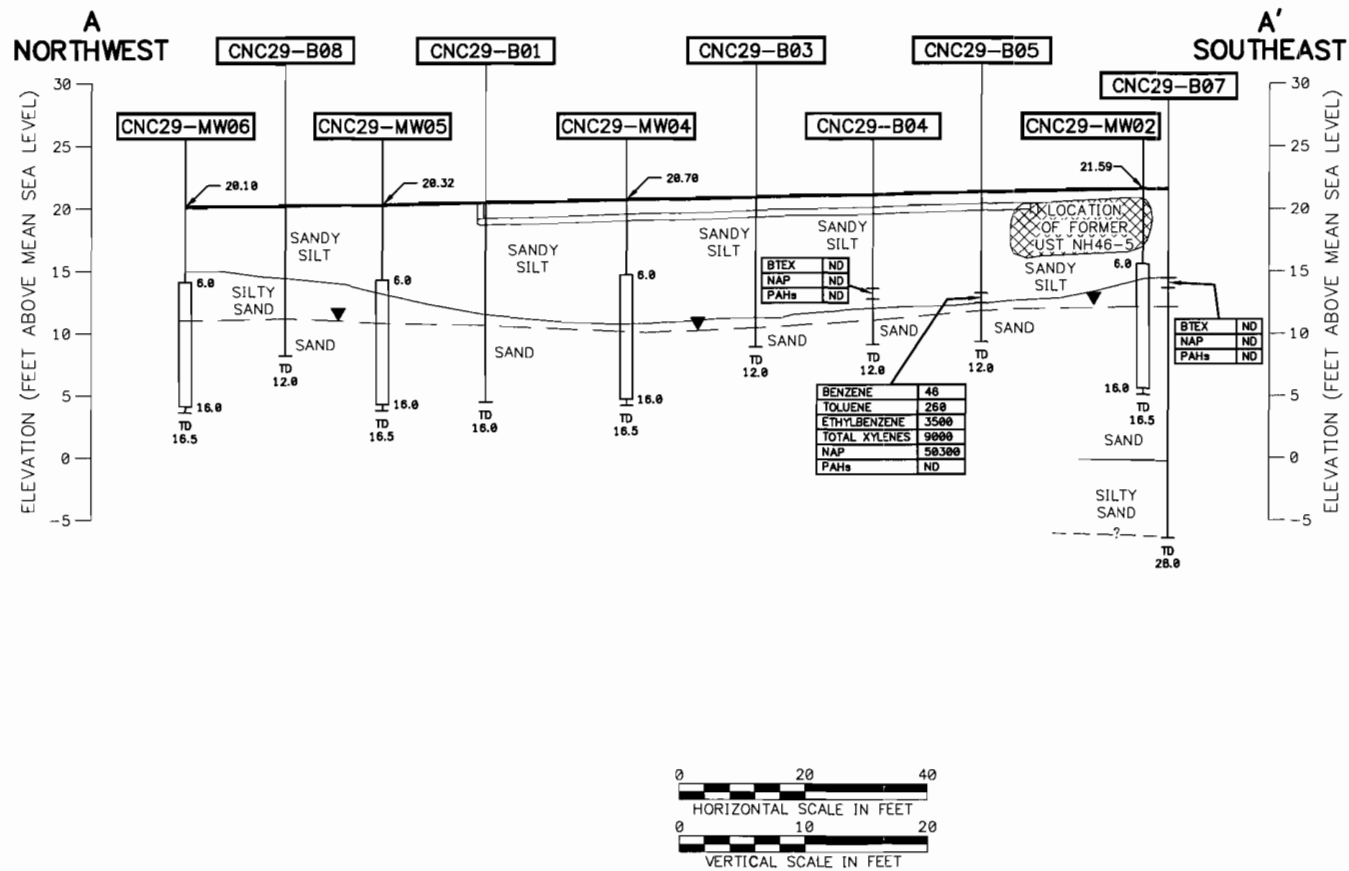
CONTRACT NO.
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APPROVED BY DATE

APPROVED BY DATE

DRAWING NO.
FIGURE 3

REV.
0



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES	DRAWN BY	DATE		GEOLOGIC CROSS SECTION A-A' SITE 29, BUILDING NH 46 ZONE C, CHARLESTON NAVAL COMPLEX NORTH CHARLESTON, SOUTH CAROLINA	CONTRACT NO.	
							DLT	10/22/99			0164	
							CHECKED BY	DATE			APPROVED BY	DATE
							COST/SCHED-AREA				APPROVED BY	DATE
							SCALE	AS NOTED			DRAWING NO.	REV.
											FIGURE 4	0

B
WEST-SOUTHWEST

ELEVATION (FEET ABOVE MEAN SEA LEVEL)

CNC29-MW03

20.81

5.0
15.0
TD
16.5

FORMER UST
FUEL PIPE

CNC29-B04

SANDY
SILT

BTEX	ND
NAP	ND
PAHs	ND

TD
12.0

CLAY
SANDY
SILT
SURFACE CASING
SURFACE TO
20.0'
CLAY
SAND
CLAY
SAND AND SHELLS
CLAY

B'
EAST-NORTHEAST

CNC29-MW07

20.88
20.57

5.0
15.0
TD
16.5

SILTY
SAND

FREE
PRODUCT

TD
16.5

CLAY

SANDY
SILT

SURFACE CASING
SURFACE TO
20.0'

CLAY

SAND

CLAY

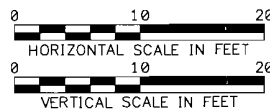
SAND AND SHELLS

CLAY

TD
41.0

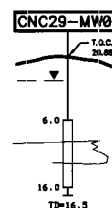
TD
41.0

ELEVATION (FEET ABOVE MEAN SEA LEVEL)



LEGEND:

MONITORING WELL
OR BORING NUMBER
GROUND SURFACE ELEVATION
GROUND SURFACE
APPROXIMATE POTENTIOMETRIC
SURFACE
TOP OF MONITORED
INTERVAL (FT BGS)
LITHOLOGIC CONTACT
(INFERRED BETWEEN BORINGS)
BOTTOM OF MONITORED
INTERVAL (FT BGS)
TOTAL DEPTH OF WELL
OR BORING (FT BGS)



DETECTED SOIL PARAMETER
CONCENTRATIONS (ug/kg)
AT SAMPLE DEPTH

BTEX	ND
NAP	ND
PAHs	ND

BTEX = BENZENE, TOLUENE,
ETHYLBENZENE AND
TOTAL XYLENES
NAP = NAPHTHALENES
PAHs = POLYNUCLEAR AROMATIC
HYDROCARBONS
ND = NOT DETECTED
(BELOW LABORATORY
DETECTION LIMITS)

NOTE:

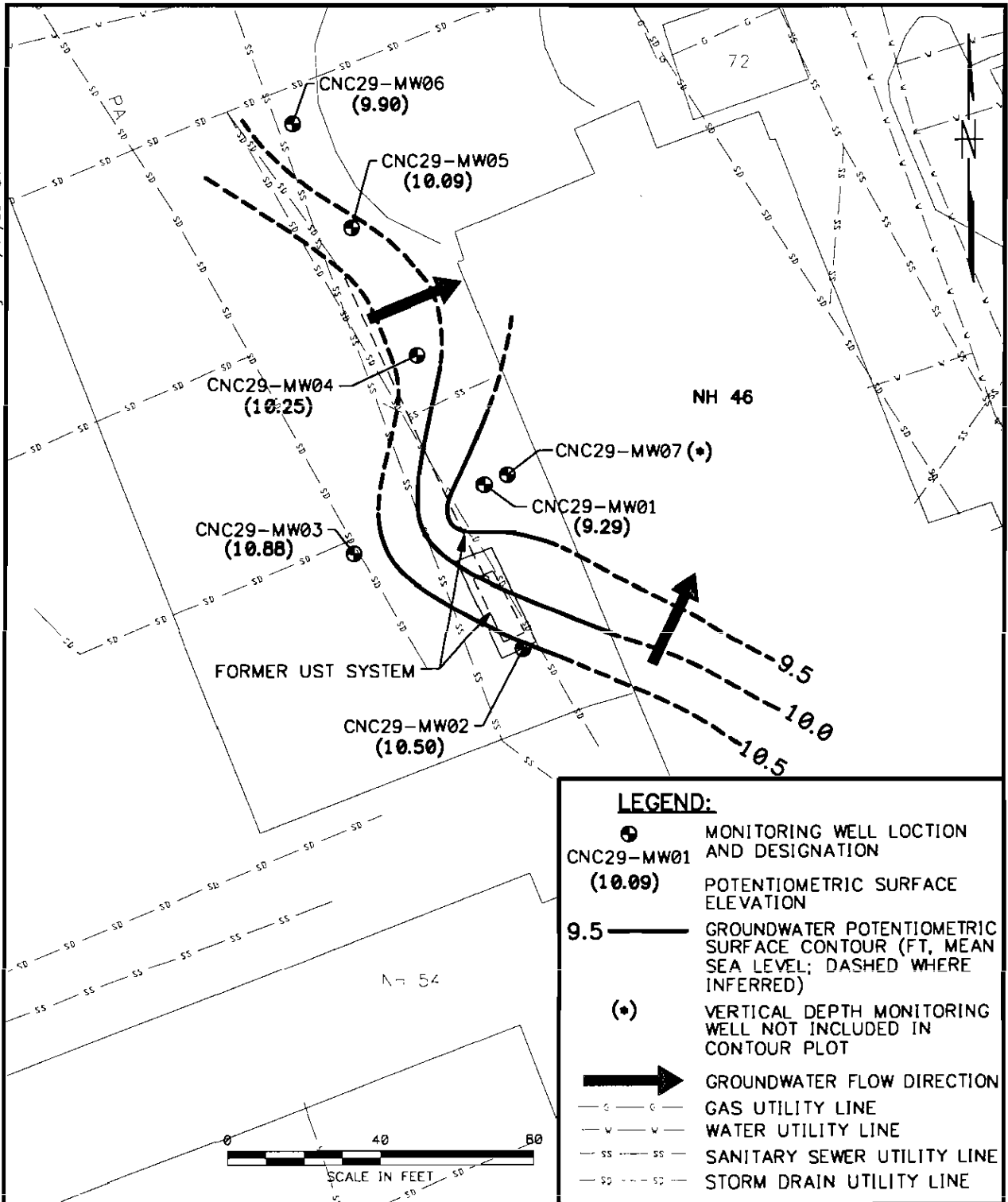
GROUNDWATER BTEX, NAPHTHALENE AND PAH
PARAMETERS REPORTED BELOW LABORATORY
DETECTION LIMITS IN MONITORING WELLS
CNC29-MW01, CNC29-MW02 AND CNC29-MW07.

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES	DRAWN BY DLT 10/22/99	DATE	CONTRACT NO. 0164
							CHECKED BY	DATE	APPROVED BY
							COST/SCHED-AREA		DATE
							SCALE AS NOTED		DRAWING NO. FIGURE 5
									REV. 0




GEOLOGIC CROSS SECTION B-B'
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

ACAD:0164CM06.dwg 10/21/99 DT

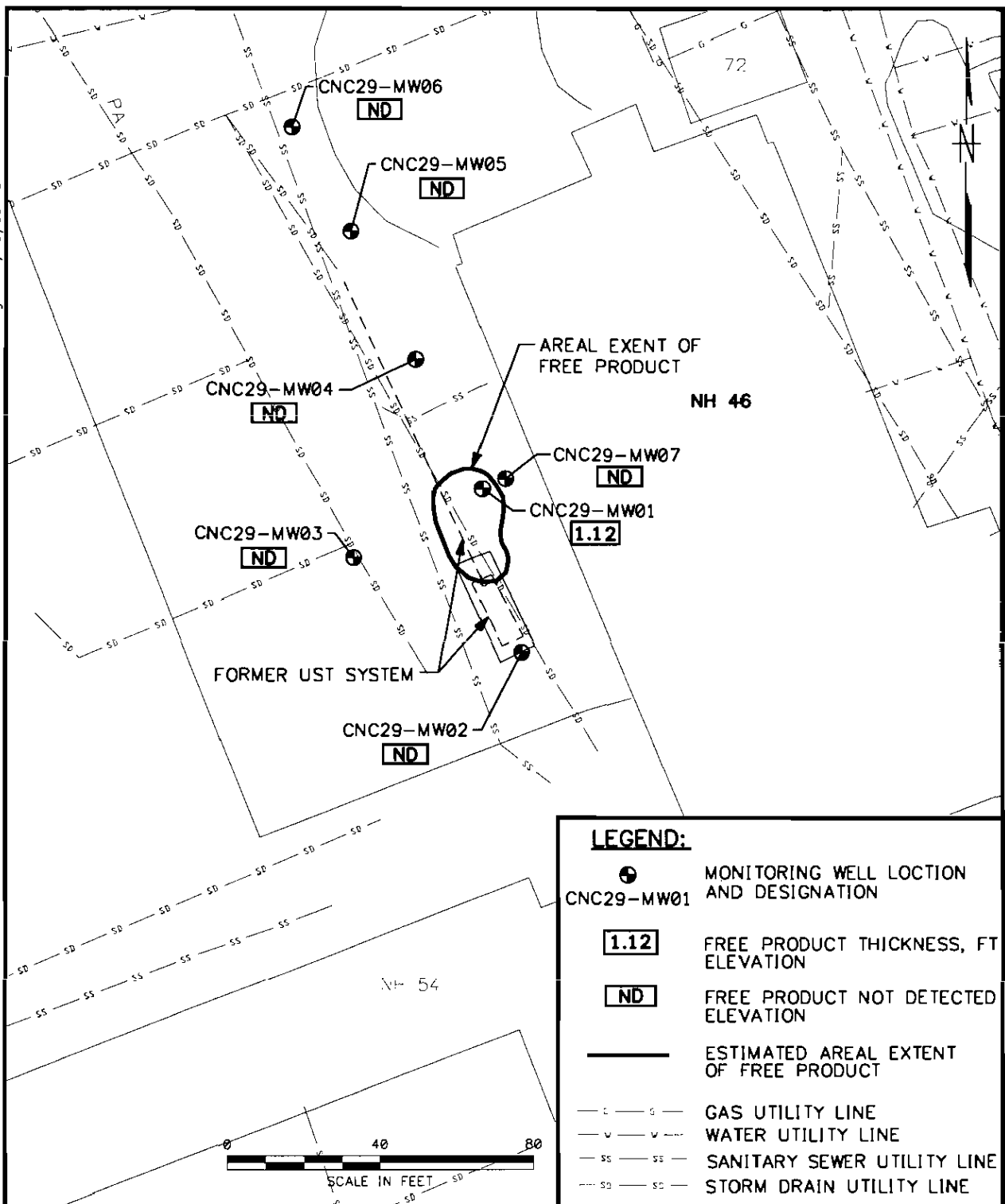


LEGEND:

- MONITORING WELL LOCATION AND DESIGNATION
CNC29-MW01 (10.09) POTENTIOMETRIC SURFACE ELEVATION
- 9.5 ——— GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR (FT. MEAN SEA LEVEL; DASHED WHERE INFERRED)
- (*) VERTICAL DEPTH MONITORING WELL NOT INCLUDED IN CONTOUR PLOT
- ➔ GROUNDWATER FLOW DIRECTION
- G - - - - - GAS UTILITY LINE
- W - - - - - WATER UTILITY LINE
- SS - - - - - SANITARY SEWER UTILITY LINE
- SD - - - - - STORM DRAIN UTILITY LINE

DRAWN BY DLT 10/21/99			GROUNDWATER POTENTIOMETRIC MAP (SEPTEMBER 10, 1999) SITE 29, BUILDIN NH 46 ZONE C, CHARLESTON NAVAL COMPLEX NORTH CHARLESTON, SOUTH CAROLINA		CONTRACT NO. 0164		
CHECKED BY					APPROVED BY		DATE
COST/SCHED-AREA					APPROVED BY		DATE
SCALE AS NOTED					DRAWING NO. FIGURE 6		REV. 0

ACAC:0164CM07.dwg 10/21/99 DT



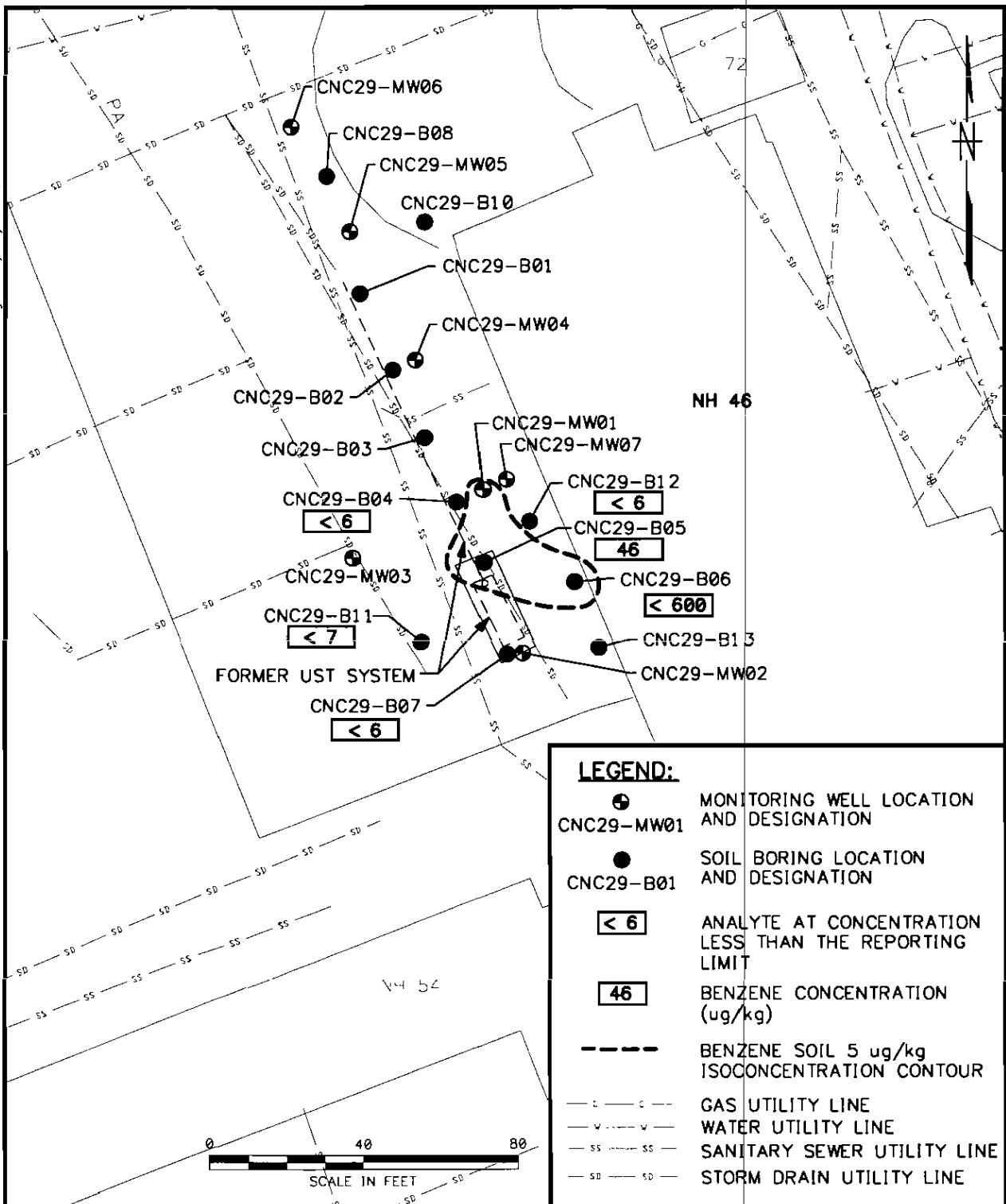
DRAWN BY DLT	DATE 10/21/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



**AREAL EXTENT OF FREE PRODUCT
(AUGUST 1999)**
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0164	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 7	REV. 0

ACAD:0164GM08.dwg 10/21/99 DT



DRAWN BY DATE
DLT 10/20/99

CHECKED BY DATE

COST/SCHED-AREA

SCALE
AS NOTED



**BENZENE SOIL CONCENTRATION MAP
(JUNE 1999)**
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO.
0164

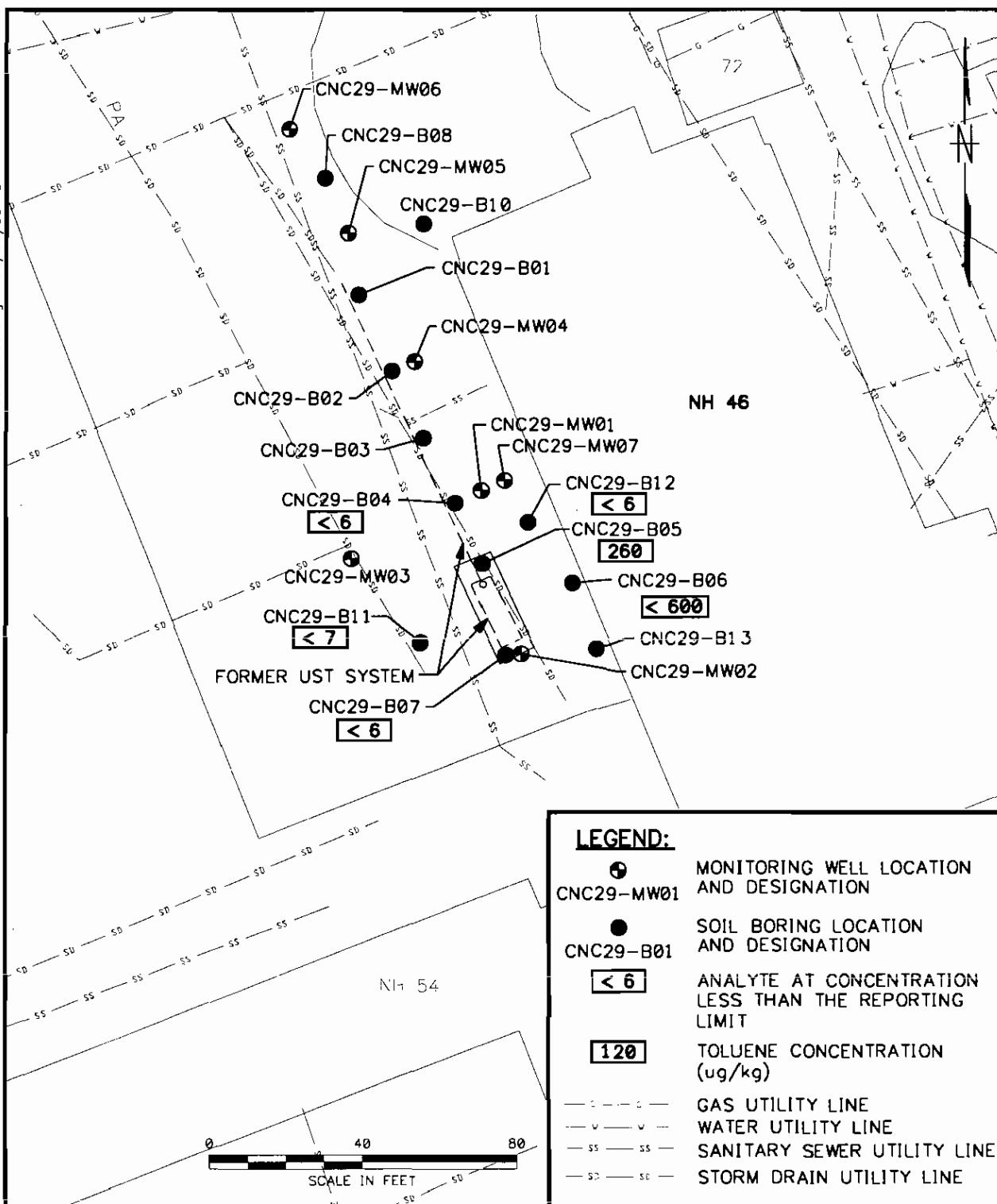
APPROVED BY DATE

APPROVED BY DATE

DRAWING NO.
FIGURE 8

REV.
0

ACAD:0164GM09.dwg 10/21/99 DT



DRAWN BY DATE
DLT 10/20/99

CHECKED BY DATE

COST/SCHED-AREA

SCALE
AS NOTED



TOLUENE SOIL CONCENTRATION MAP
(JUNE 1999)
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

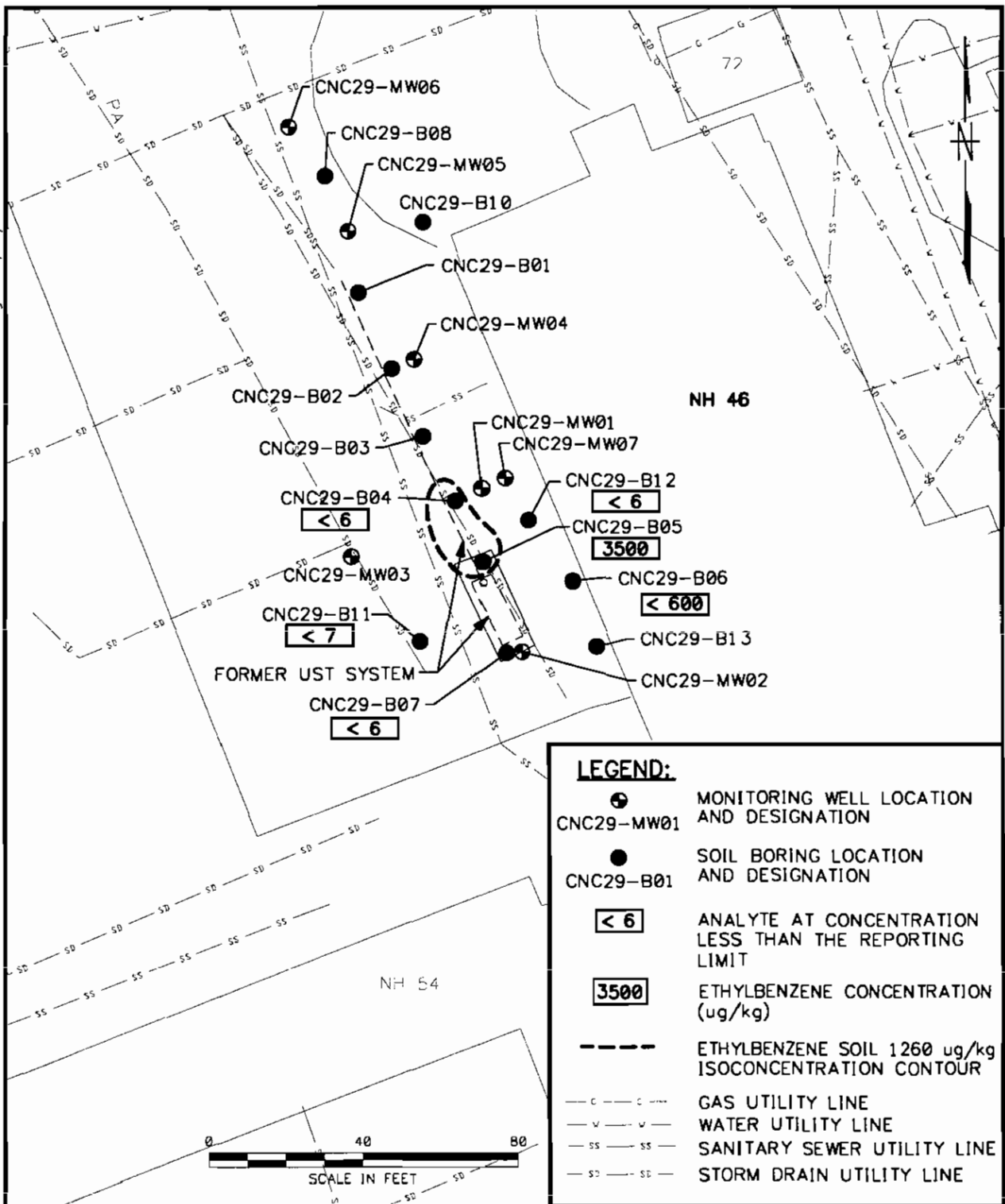
CONTRACT NO.
0164

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. REV.
FIGURE 9 0

ACAD: 01.64GM10.dwg 10/21/99 DT



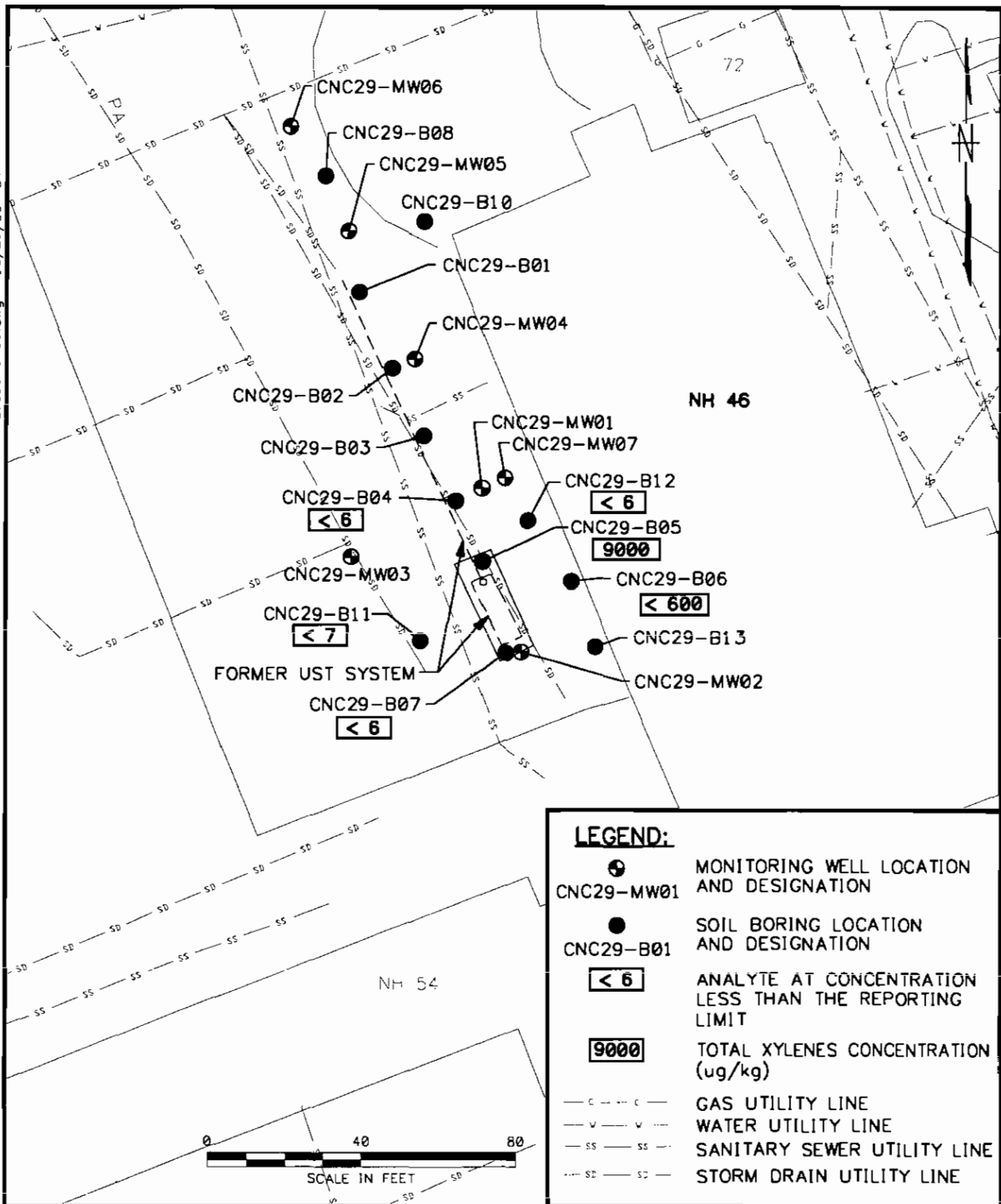
DRAWN BY DLT	DATE 10/20/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



ETHYLBENZENE SOIL CONCENTRATION MAP
(JUNE 1999)
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0164	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 10	REV. 0

ACAD:0164GM11.dwg 10/21/99 DT



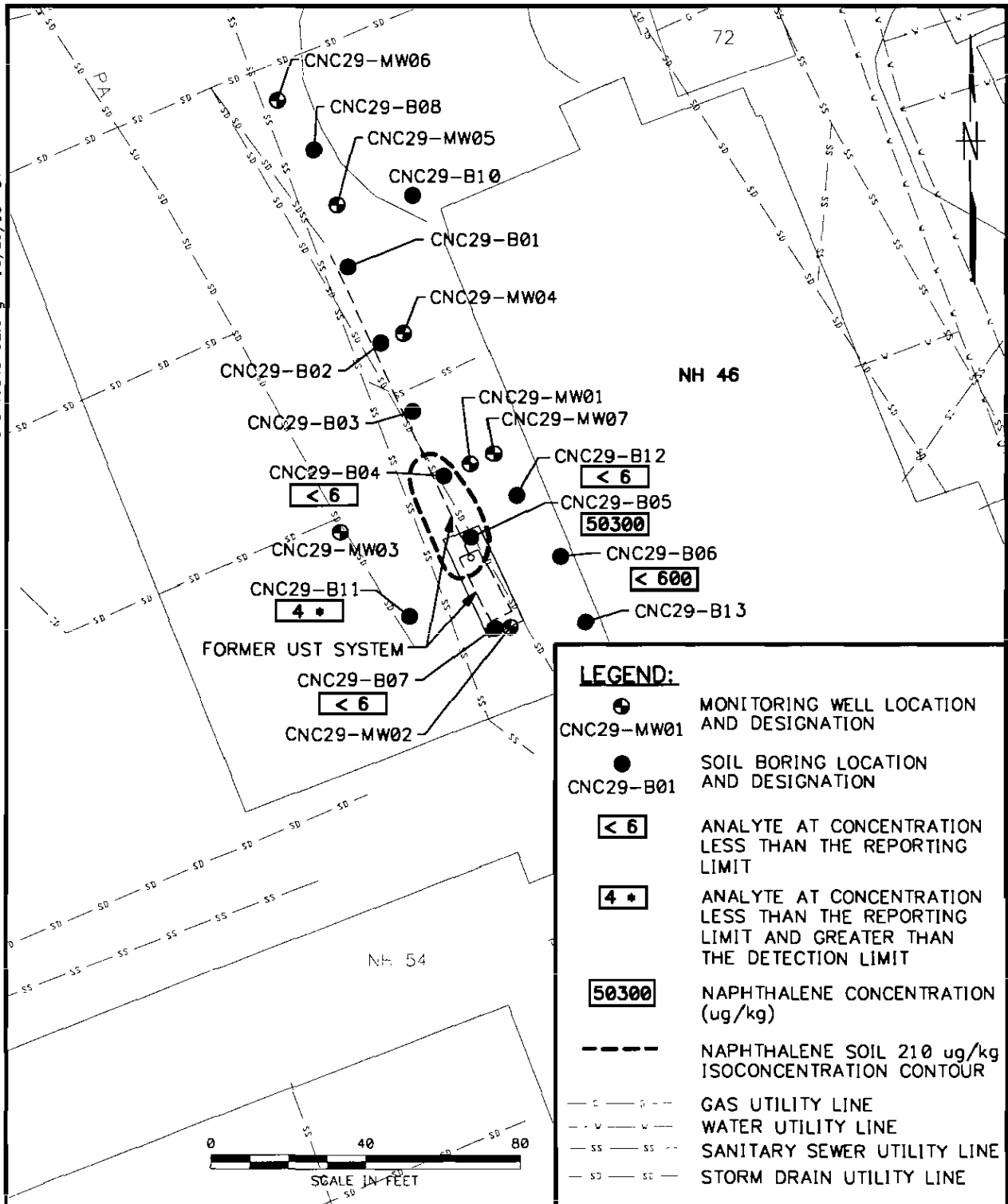
DRAWN BY DLT	DATE 10/20/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



**TOTAL XYLENES SOIL CONCENTRATION MAP
(JUNE 1999)**
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0164	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 11	REV. 0

ACAD:0164GM12.dwg 10/21/99 DT

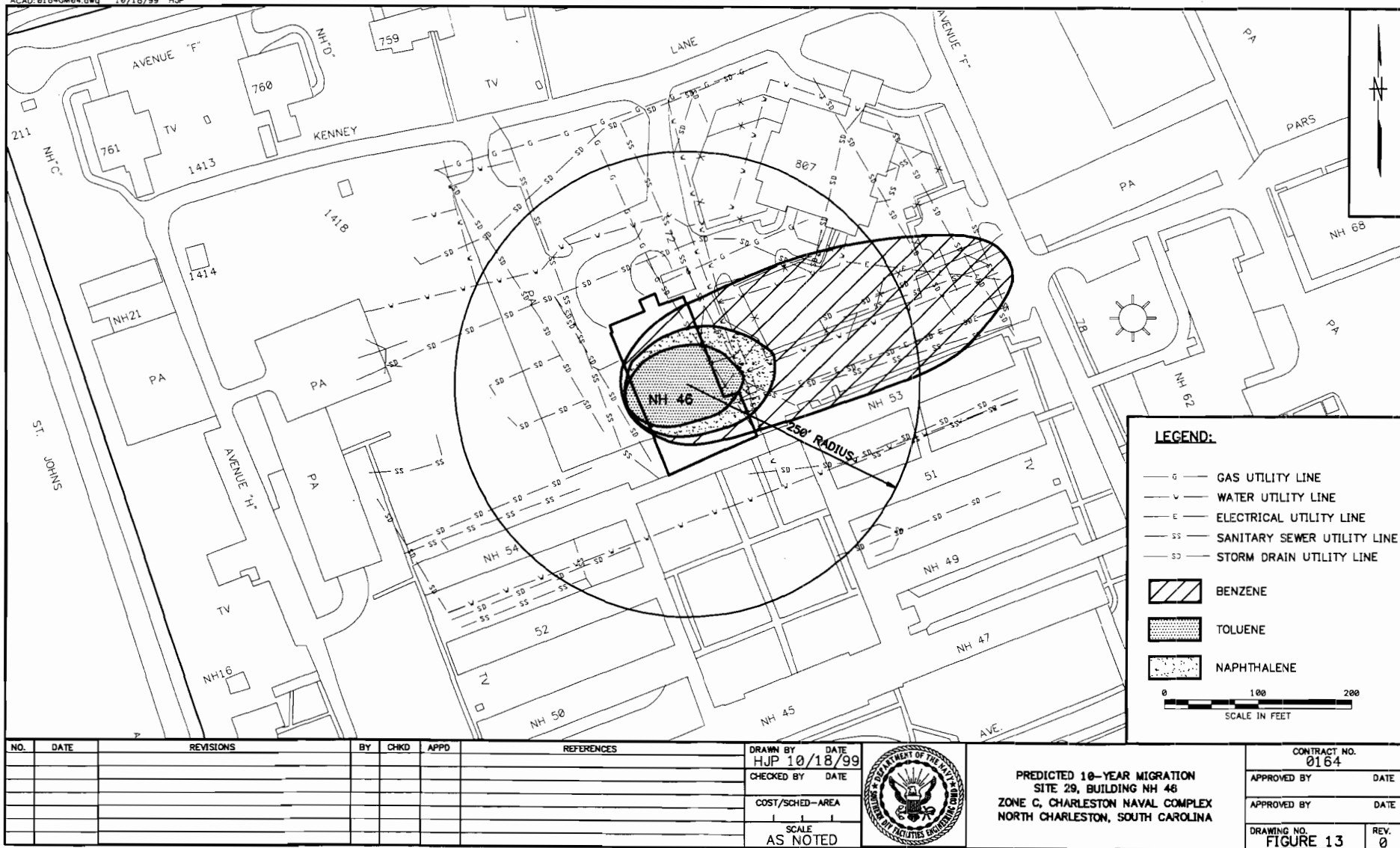


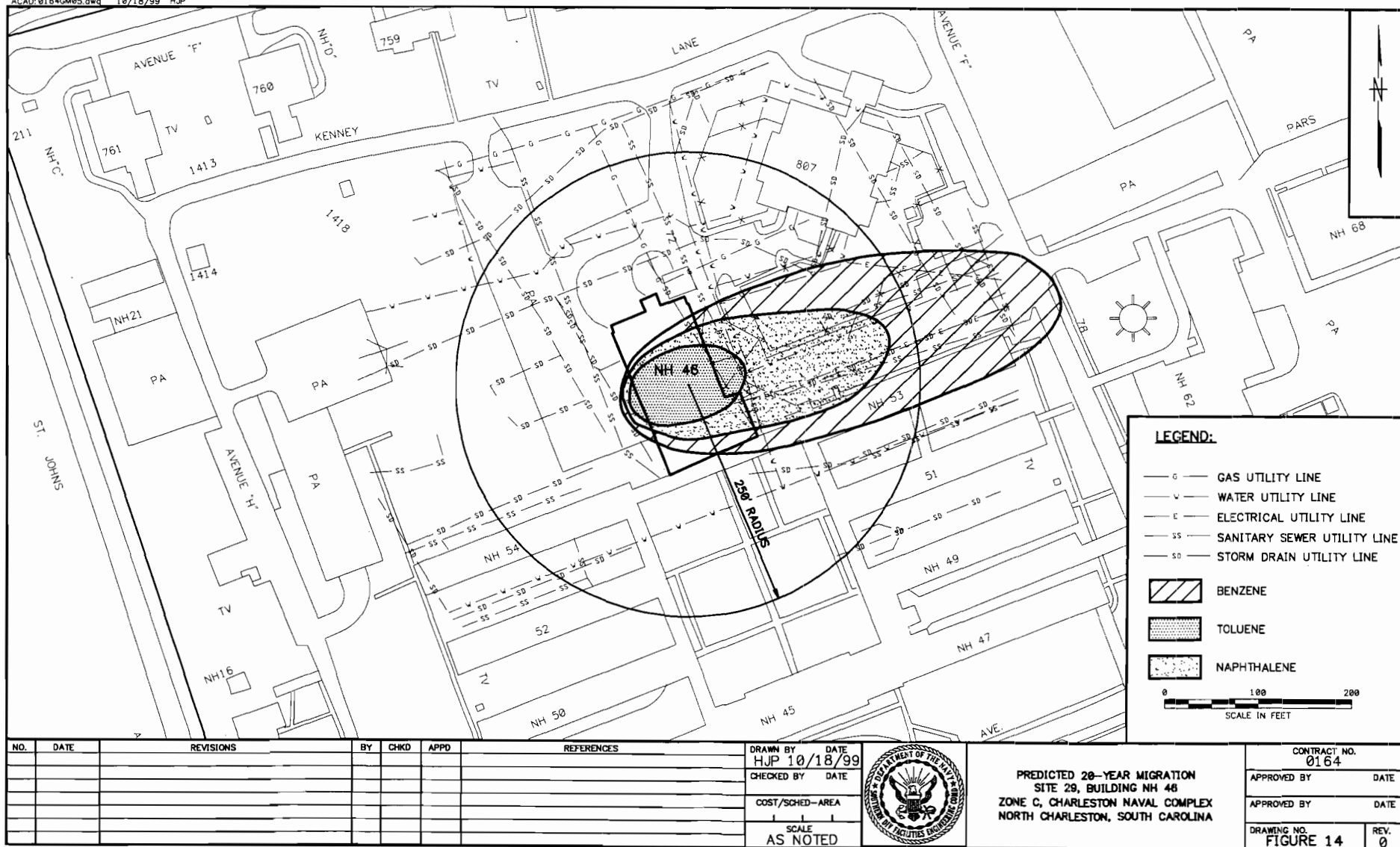
DRAWN BY DLT	DATE 10/20/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



NAPHTHALENE SOIL CONCENTRATION MAP
(JUNE 1999)
SITE 29, BUILDING NH 46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0164	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 12	REV. 0





APPENDIX A

UNDERGROUND STORAGE TANK ASSESSMENT REPORT – UST NH46-5



**SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
FACSIMILE**



From The Desk Of

Facsimile No.: (843) 820-7465

Telephone No.: (843) 820-7307

THIS FACSIMILE CONTAINS THREE (3) PAGES
December 11, 1998

To: **PAUL CALLIGAN
TETRA TECH, NUS**

Facsimile No.: (850) 656-7403

Telephone No.: (850) 656-5458

NOTE:

1. The following is the South Carolina DHEC response letter to tank NH 46-5.
2. If you have any questions please give me a call.



8 December 1998

2600 Bull Street
Columbia, SC 29201-1708

COMMISSIONER:
Douglas E. Bryant

BOARD:
John H. Burriss
Chairman

William M. Hull, Jr., MD
Vice Chairman

Roger Leake, Jr.
Secretary

Mark B. Kent

Cyndi C. Mosteller

Brian K. Smith

Rodney L. Grandy

Department of the Navy
Southern Division NFEC
P.O. Box 190010
North Charleston, SC 29419-9010
Attention: Mr. Gabriel Magwood

Re: **Underground Storage Tank Assessment Report dated 19 October 1998**
Facility NH 46 (UST NH 46-5) (Site Identification # 01206)
Charleston Naval Complex/Charleston Naval Base
Charleston, SC
Charleston County

Dear Mr. Magwood:

The author has completed technical review of the referenced document. As submitted, the report provides a narrative describing closure activities and analytical results of environmental sampling to determine if releases have occurred as a result of operation of the referenced vessel and/or associated piping system. The analytical results provided indicate reportable concentrations of BTEX and PAH compounds were detected in soil grab samples obtained from the UST and piping run excavations. Although soil sample results for PAH compounds within the UST excavation were reported as BDL (below detection limits) the detection limit for these samples were elevated due to matrix interference. As noted in previous correspondence (Bristol to Arney, 2 September 1997), when contaminant concentrations are reported as zero (0) or BDL it will be assumed that the chemical constituent is equal to the elevated detection limit. With this consideration, the reported concentrations approach or exceed levels proposed in the SCAP (Soil Corrective Action Plan amended July 1997) for the Charleston Naval Complex and appear to indicate that additional endeavors for remedial actions and contaminant characterization are warranted at the referenced site. In this regard, assessment/corrective action activities proposed in the Tank Management Plan (dated October 1996) should be implemented in an appropriate and timely manner. Employed activities should be technically sufficient and reasonable to determine the extent and severity of suspected contamination. Please be reminded that groundwater sampling, if necessary, will require construction of sampling points and will need to be submitted for prior review and approval, as appropriate.

South Carolina Department of Health and Environmental Control (S.C.D.H.E.C.)
Underground Storage Tank (UST) Assessment Report

Submit Completed Form to:

Date Received

State Use Only

UST Regulatory Section
SCDHEC
2600 Bull Street
Columbia, South Carolina 29201
Telephone (803) 734-5331

I OWNERSHIP OF UST(S)

Agency/Owner: Southern Division, Naval Facilities Engineering Command, Caretaker Site Office

Mailing Address: P.O. Box 190010

City: N. Charleston

State: SC

Zip Code: 29419-9010

Area Code: 843 Telephone Number: 743-9985 Contact Person: Henry N. Shepard II, P. E.

II SITE IDENTIFICATION AND LOCATION

Site I.D. #: Unregulated

Facility Name: Charleston Naval Base Complex, NH46

Street Address: Turnbull Avenue

City: North Charleston, 29405-2413

County: Charleston

III CLOSURE INFORMATION

Closure Started: 24 Aug 1998

Closure Completed: 22 Sept 1998

Number of USTs Closed: 1

N/A

Consultant

SPORTENVDETHASN

UST Removal Contractor

IV. CERTIFICATION (Read and Sign after completing entire submittal)

I certify that I have personally examined and am familiar with the information submitted in this and all attached documents; and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate and complete.

Henry Shepard II, P. E.

Name (Type or Print)

Henry N. Shepard II P.E.

Signature

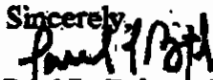
Charleston Naval Complex/Charleston Naval Base

8 December 1998

page 2

Should you have any questions please contact me at (803) 898-3559.

Sincerely,



Paul L. Bristol, Hydrogeologist

Groundwater Quality Section

Bureau of Water

cc: Trident District EQC

V. UST INFORMATION

- A. Product.....
- B. Capacity.....
- C. Age.....
- D. Construction Material.....
- E. Month/Year of Last Use.....
- F. Depth (ft.) To Base of Tank.....
- G. Spill Prevention Equipment Y/N.....
- H.. Overfill Prevention Equipment Y/N.....
- I. Method of Closure Removed/Filled....
- J. Visible Corrosion or Pitting Y/N.....
- K. Visible Holes Y/N.....

Tank 1	Tank 2	Tank 3	Tank 4	Tank 5
Fuel oil				
1,500 gal				
1941				
Steel				
Unk.				
6'				
N				
N				
R				
Y				
N				

- L. Method of disposal for any USTs removed from the ground (attach disposal manifests)

UST NH46-5 was removed, drained, cut open at both ends, and cleaned with a steam cleaner. It was then cut up for recycling as scrap metal. (See Attachment III.)

- M. Method of disposal for any liquid petroleum, sludges, or waste waters removed from the USTs (attach disposal manifests)

The sludge, waste water, and residual fuel oil from UST NH46-5 were recycled.

- N. If any corrosion, pitting, or holes were observed, describe the location and extent for each UST

UST NH46-5 was sound, although covered with rust which had not penetrated the sheet metal. However, the backhoe accidentally punctured the tank at 6 feet below ground surface level during the digging process. See Site Map 3.

VI. PIPING INFORMATION

- A. Construction Material.....
- B. Distance from UST to Dispenser.....
- C. Number of Dispensers.....
- D. Type of System P/S.....
- E. Was Piping Removed from the Ground? Y/N....
- F. Visible Corrosion or Pitting Y/N.....
- G. Visible Holes Y/N.....
- H. Age.....

Tank 1	Tank 2	Tank 3	Tank 4	Tank 5
Steel & copper				
26'				
See note 1				
1				
See note 1				
S				
Y				
Y				
N				
1941				

Note 1: UST NH46-5 provided heating fuel oil to Building NH46.

- I. If any corrosion, pitting, or holes were observed, describe the location and extent for each line.

The piping was covered with surface rust throughout the run. One loose joint was found. See Site Map 2.

VII. BRIEF SITE DESCRIPTION AND HISTORY

Facility NH46 was constructed in 1941 and served as part of the Naval Hospital complex. UST NH46-5 provided fuel oil to the boilers and emergency generators of building NH46. The tank was abandoned at an unknown date.

UST NH46-5 was first identified as a possible location for an underground tank. The only evidence that was found for the tank was an open top pipe next to a stairway in an empty parking lot over 100 feet from the tank's actual location. The tank location was approximated through the use of a magnetometer and the Building NH 46 boiler room piping and vent. The asphalt, rock and soil covering the tank had to be removed to find it. The tank was full and could not be emptied until it was uncovered, due to the remote fill line. Unfortunately, during the excavation/search for the tank, the backhoe punctured the tank resulting in a spill of approximately 50 gallons of heating fuel oil that was in the tank (see Attachment I Photo 2).

The fluid, and the soil saturated by the spill was over excavated, and sampled for disposal. Additionally, a sample was taken from the soils below the area that was over excavated during the clean-up. Efforts to remove all soil affected by the spill were taken, but the sample of the area below the over excavation showed no significant difference in contamination levels from the saturated soil which was removed. Both areas had relatively high levels of volatiles (BETX/Naphthalene) and detection levels for semi-volatiles (PAHs) which were too high to for significant analysis.

VIII. SITE CONDITIONS

	Yes	No	Unk
<p>A. Were any petroleum-stained or contaminated soils found in the UST excavation, soil borings, trenches, or monitoring wells?</p> <p>If yes, indicate depth and location on the site map.</p> <p style="text-align: center;">See note 1.</p>		X	
<p>B. Were any petroleum odors detected in the excavation, soil borings, trenches, or monitoring wells?</p> <p>If yes, indicate location on site map and describe the odor (strong, mild, etc.)</p> <p style="text-align: center;">[beneath pipe run - mild]</p>	X		
<p>C. Was water present in the UST excavation, soil borings, or trenches?</p> <p>If yes, how far below land surface (indicate location and depth)?</p> <p>_____</p>		X	
<p>D. Did contaminated soils remain stockpiled on site after closure?</p> <p>If yes, indicate the stockpile location on the site map.</p> <p>Name of DHEC representative authorizing soil removal:</p> <p style="text-align: center;">See note 2.</p> <p>_____</p>		X	
<p>E. Was a petroleum sheen or free product detected on any excavation or boring waters?</p> <p>If yes, indicate location and thickness.</p> <p style="text-align: center;">See note 3.</p>		N/A	

Notes:

1. The release within the UST excavation was an accident caused by DET personnel. It was not a condition of the subject tank/piping that was discovered .
2. Petroleum impacted soil has been drummed and segregated for disposal by a recycling facility.
3. No groundwater was encountered.

IX. SAMPLE INFORMATION

A. SCDHEC Lab Certification Number 10120

B.

[illegible]

* = Depth Below the Surrounding Land Surface

X. SAMPLING METHODOLOGY

Provide a detailed description of the methods used to collect and store (preserve) the samples.

After the removal of UST NH46-5 soil samples were taken. Sampling was performed in accordance with SC DHEC R.61-92 Part 280 and SC DHEC UST Assessment Guidelines.

Sample jars were prepared by the testing laboratory. The grab method was utilized to fill the sample containers leaving as little head space as possible and immediately capped. Soil samples were extracted at the tank ends. UST piping soil samples were taken under the piping at the mechanical connections. Samples for volatiles were taken using the Encore sampler and T-handle.

The samples were marked, logged, and immediately placed in sample coolers packed with ice to maintain an approximate temperature of 4° C. Tools were thoroughly cleaned and decontaminated with organic-free soap and water after each sample.

The samples remained in the custody of SPORTENVDETHASN until they were transferred to General Engineering Laboratories for analysis as documented in the attached Chain-of-Custody Record.

XI. RECEPTORS

Yes No

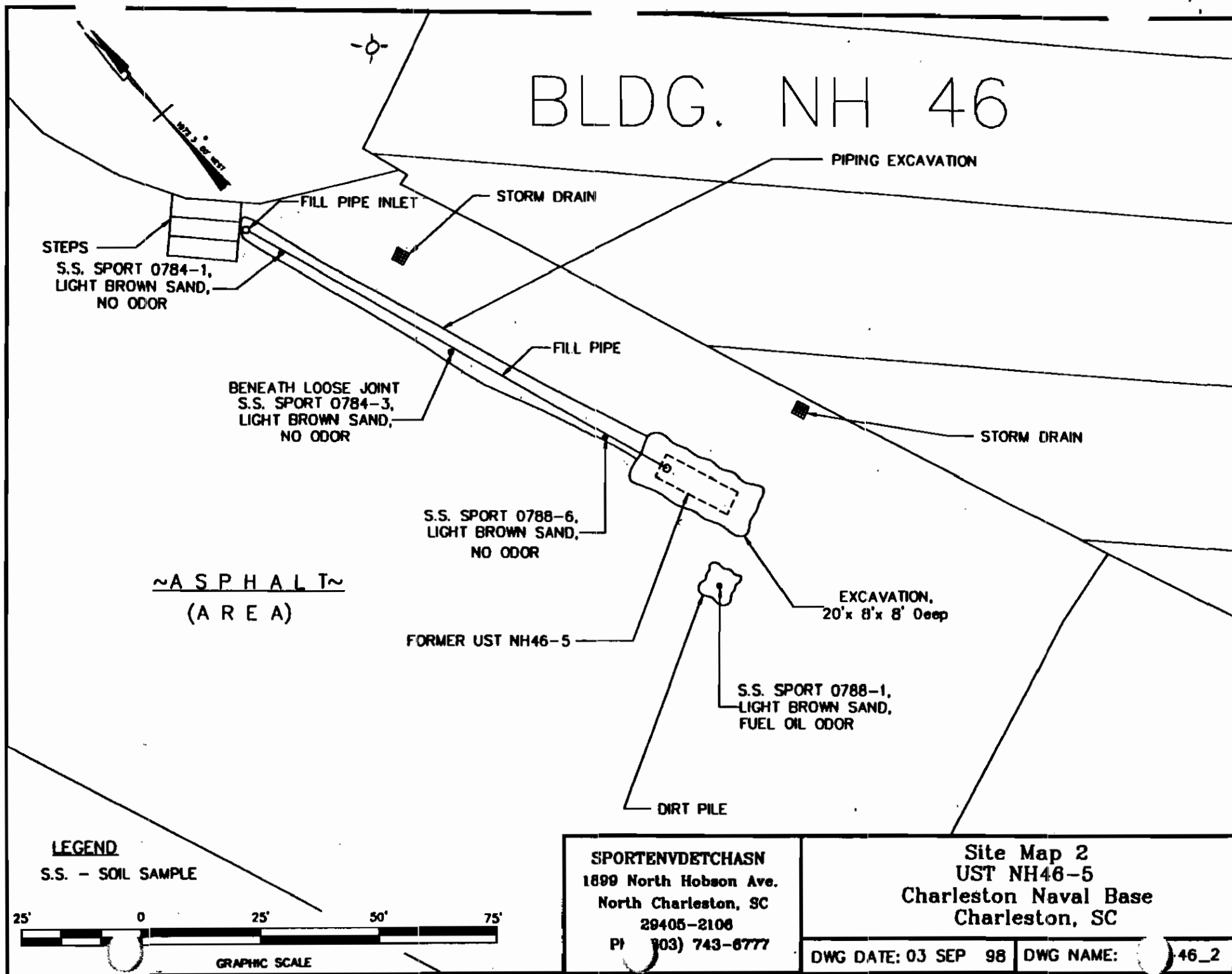
<p>A. Are there any lakes, ponds, streams, or wetlands located within 1000 feet of the UST system?</p> <p>If yes, indicate type of receptor, distance, and direction on site map.</p>		X
<p>B. Are there any public, private, or irrigation water supply wells within 1000 feet of the UST system?</p> <p>If yes, indicate type of well, distance, and direction on site map.</p>		X
<p>C. Are there any underground structures (e.g., basements) located within 100 feet of the UST system?</p> <p>If yes, indicate the type of structure, distance, and direction on site map.</p> <p>[Bldg NH46 - ground floor partially below GSL]</p>	X	
<p>D. Are there any underground utilities (e.g., telephone, electricity, gas, water, sewer, storm drain) located within 100 feet of the UST system that could potentially come in contact with the contamination?</p> <p>If yes, indicate the type of utility, distance, and direction on the site map.</p> <p>[storm drain]</p>	X	
<p>E. Has contaminated soil been identified at a depth of less than 3 feet below land surface in an area that is not capped by asphalt or concrete?</p> <p>If yes, indicate the area of contaminated soil on the site map.</p>		X

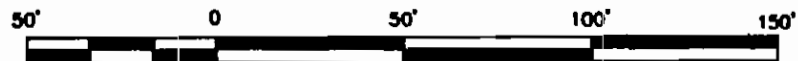
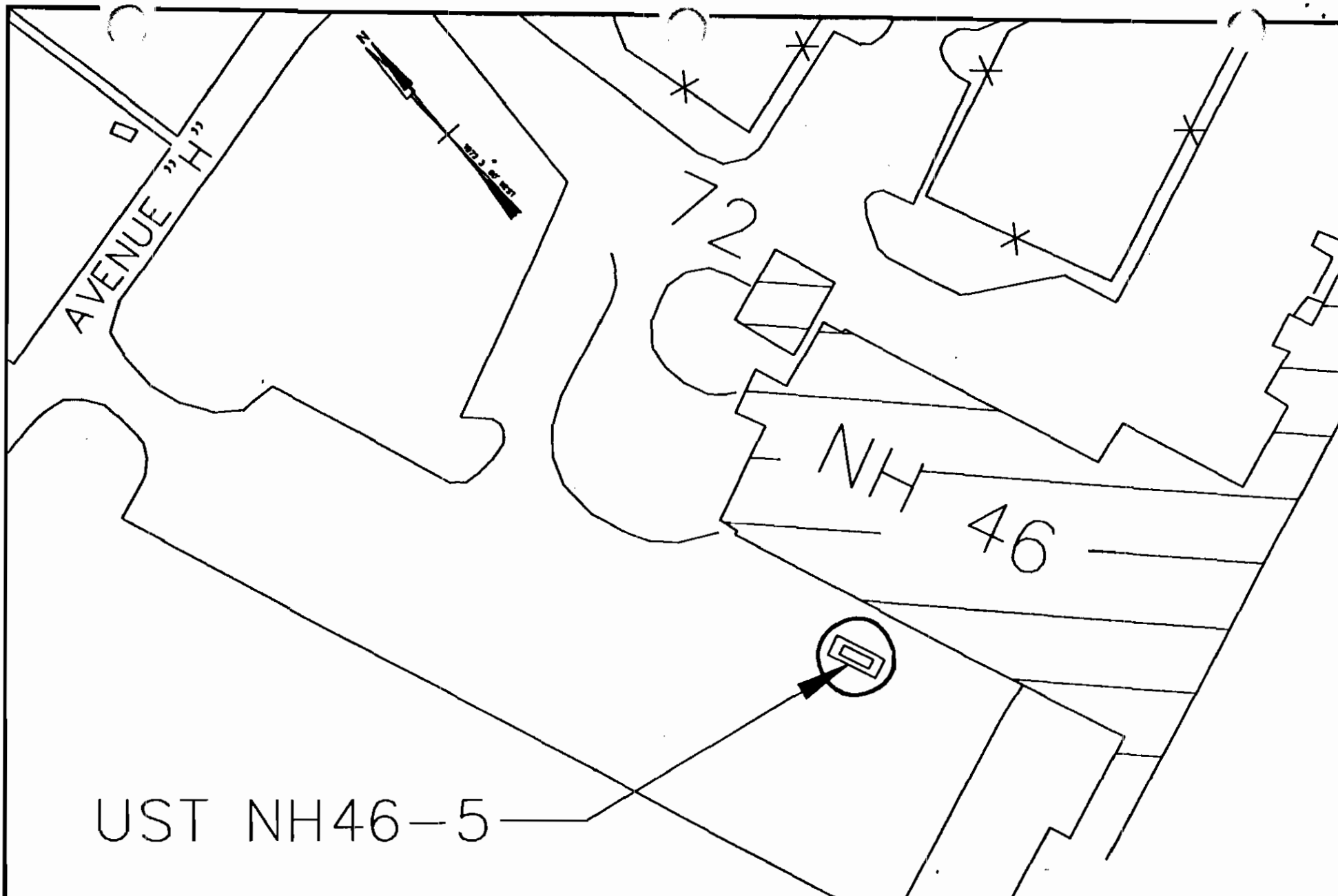
Attachment I

SITE MAP

You must supply a scaled site map. It should include all buildings, road names, utilities, tank and pump island locations, sample locations, extent of excavation, and any other pertinent information.

Site Maps 1, 2, and 3
Photographs 1 thru 4





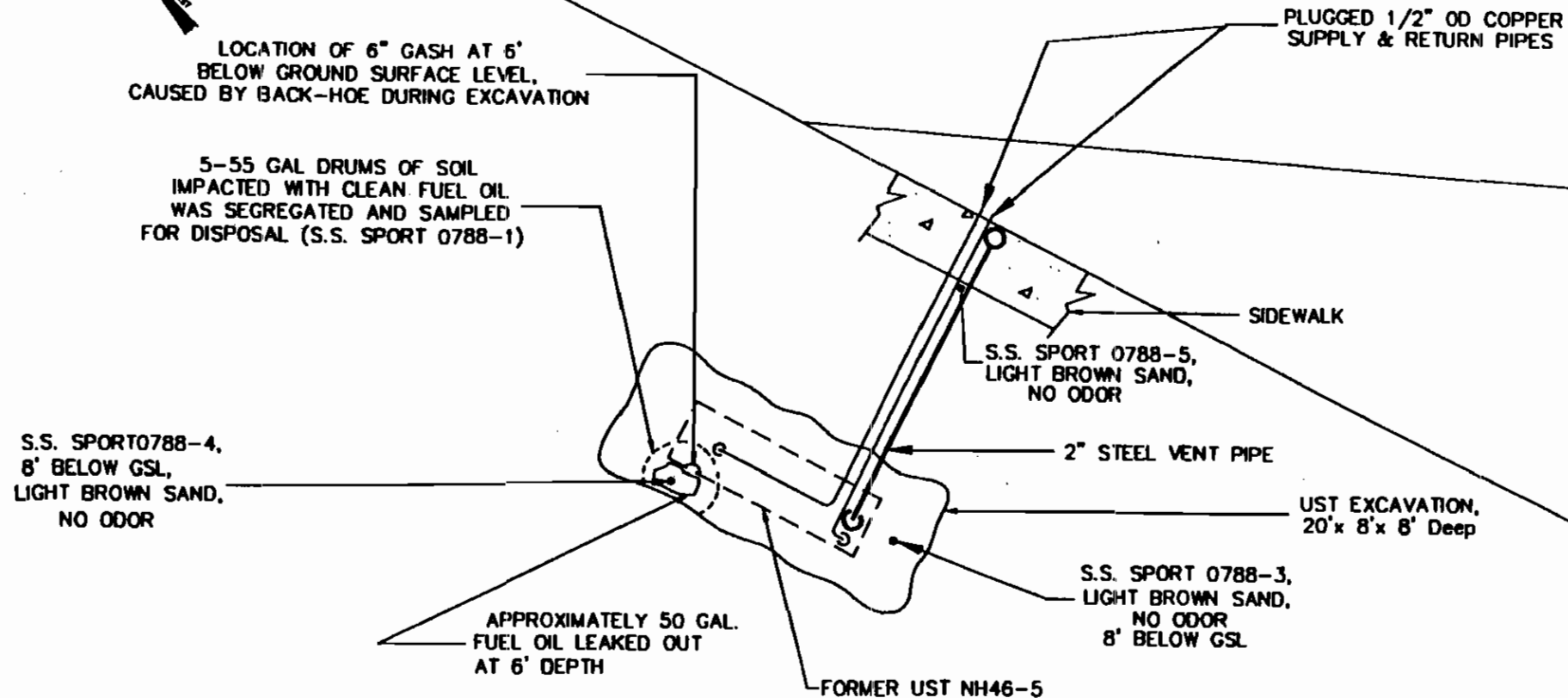
GRAPHIC SCALE

SPORTENVDECHASN
1899 North Hobson Ave.
North Charleston, SC
29405-2108
Ph. (803) 743-8777

Site Map 1
UST NH46-5
Charleston Naval Base
Charleston, SC

DWG DATE: 01 SEP 98 | DWG NAME: NH-46_1

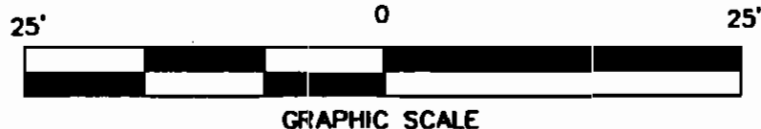
BLDG. NH 46



LEGEND

S.S. - SOIL SAMPLE
GSL - GROUND SURFACE LEVEL

(* NO GROUND WATER WAS ENCOUNTERED)



SPORTENVDETHASN
1899 North Hobson Ave.
North Charleston, SC
28405-2106
Ph. (803) 743-6777

Site Map 3
UST NH46-5
Charleston Naval Base
Charleston, SC

DWG DATE: 16 SEP 98 DWG NAME: NH-46_3



Photo 1: Building NH46 parking lot. The UST was located near the stairs.



Photo 2: Fuel oil spill.



Photo 3: UST NH46-5 exposed.



Photo 4: UST NH46-5 during removal.

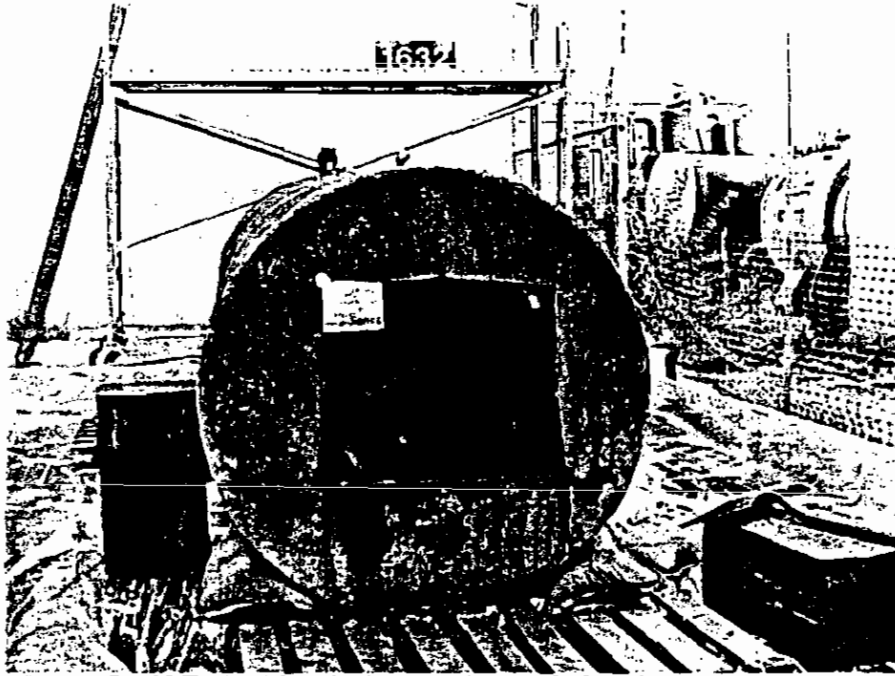
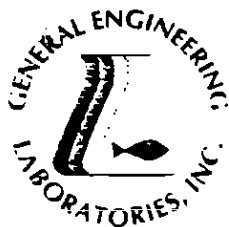


Photo 5: UST NH46-5 during cutting and cleaning.

ANALYTICAL RESULTS

You must submit the laboratory report and chain-of-custody form for the samples. These samples must be analyzed by a South Carolina certified laboratory.

**Certified Analytical Results
Chain-of-Custody**



GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 02, 1998

Page 1 of 3

Sample ID : SPORT0784-1
Lab ID : 9808866-01
Matrix : Soil
Date Collected : 08/25/98
Date Received : 08/25/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>BTEX + NAPTH. - 5 items</i>											
Benzene	U	ND	0.560	1.12	ug/kg	1.0	JEB	08/30/98	1552	129984	
Ethylbenzene	U	ND	0.336	1.12	ug/kg	1.0					
Naphthalene	U	ND	0.672	1.12	ug/kg	1.0					
Toluene	U	ND	1.01	1.12	ug/kg	1.0					
Xylenes (TOTAL)	U	ND	0.784	2.24	ug/kg	1.0					
Extractable Organics											
<i>Polynuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	ND	158	330	ug/kg	1.0	RLC	08/28/98	1800	129634	2
Acenaphthylene	U	ND	145	330	ug/kg	1.0					
Anthracene	U	ND	85.8	330	ug/kg	1.0					
Benzo(a)anthracene	U	ND	66.0	330	ug/kg	1.0					
Benzo(a)pyrene	U	ND	72.6	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	ND	142	330	ug/kg	1.0					
Benzo(ghi)perylene	U	ND	79.2	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	ND	132	330	ug/kg	1.0					
Chrysene	U	ND	52.8	330	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	ND	82.5	330	ug/kg	1.0					
Fluoranthene	U	ND	66.0	330	ug/kg	1.0					
Fluorene	U	ND	112	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	ND	79.2	330	ug/kg	1.0					
Naphthalene	U	ND	155	330	ug/kg	1.0					
Phenanthrene	U	ND	59.4	330	ug/kg	1.0					
Pyrene	U	ND	72.6	330	ug/kg	1.0					

The following prep procedures were performed:
GC/MS Volatiles (8260 High Level)

JEB 08/30/98 0900 129984 3

P O Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29414

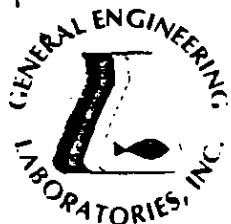
(843) 556-8171 • Fax (843) 766-1178

9808866-01



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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 02, 1998

Page 2 of 3

Sample ID : SPORT0784-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
GC/MS Base/Neutral Compounds							RDH	08/26/98	2015	129634	4

Comments:

Data reported in mass/mass units is reported 'as received'.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	80.5	(30.0 - 115.)
Nitrobenzene-d5	M610	95.0	(23.0 - 120.)
p-Terphenyl-d14	M610	83.5	(37.3 - 128.)
Bromofluorobenzene	BTEX+NAP-8260B	74.5	(53.5 - 154.)
Dibromofluoromethane	BTEX+NAP-8260B	89.6	(63.4 - 136.)
Toluene-d8	BTEX+NAP-8260B	109.	(72.1 - 137.)

M = Method	Method-Description
M 1	SW846 8260B
M 2	EPA 8270
M 3	EPA 5035
M 4	EPA 3550

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.





GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/R
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 02, 1998

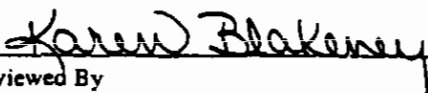
Page 3 of 3

Sample ID : SPORT0784-1

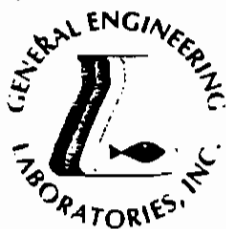
M = Method

Method-Description

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Karen Blakeney at (803) 769-7386.


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STATE	GEL	EPI
FL	E87156/87294	E87472/874
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 02, 1998

Page 1 of 2

Sample ID : SPORT0784-2
Lab ID : 9808866-02
Matrix : Soil
Date Collected : 08/25/98
Date Received : 08/25/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX + NAPTH. - 5 items											
Benzene	U	ND	0.500	1.00	ug/kg	1.0	JEB	08/30/98	1520	129984	
Ethylbenzene	U	ND	0.300	1.00	ug/kg	1.0					
Naphthalene	U	ND	0.600	1.00	ug/kg	1.0					
Toluene	U	ND	0.900	1.00	ug/kg	1.0					
Xylenes (TOTAL)	U	ND	0.700	2.00	ug/kg	1.0					

The following prep procedures were performed:

GC/MS Volatiles (8260 High Level)

JEB 08/30/98 0900 129984 2

Comments:

Data reported in mass/mass units is reported 'as received'.

Surrogate Recovery	Test	Percent%	Acceptable Limits
Bromofluorobenzene	BTEX+NAP-8260B	83.3	(53.5 - 154.)
Dibromofluoromethane	BTEX+NAP-8260B	81.5	(63.4 - 136.)
Toluene-d8	BTEX+NAP-8260B	95.9	(72.1 - 137.)

M = Method	Method-Description
M 1	SW846 8260B
M 2	EPA 5035





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NC	233	
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TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106
Contact: Mr. Bill Hiers
Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 02, 1998

Page 2 of 2

Sample ID : SPORT0784-2

M = Method

Method-Description

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

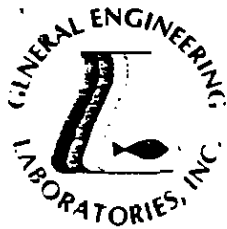
U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
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TN	02934	02934

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SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

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Report Date: September 02, 1998

Page 1 of 3

Sample ID : SPORT0784-3
Lab ID : 9808866-03
Matrix : Soil
Date Collected : 08/25/98
Date Received : 08/25/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>BTEX + NAPTH. - 5 items</i>											
Benzene	U	ND	54.5	109	ug/kg	50.	JEB	08/31/98	1323	129984	
Ethylbenzene	J	63.2	32.7	109	ug/kg	50.					
Naphthalene		388	65.4	109	ug/kg	50.					
Toluene	U	ND	98.1	109	ug/kg	50.					
Xylenes (TOTAL)	J	183	76.3	218	ug/kg	50.					
Extractable Organics											
<i>Polynuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	ND	6340	13200	ug/kg	40.	RLC	08/28/98	1828	129634	2
Acenaphthylene	U	ND	5810	13200	ug/kg	40.					
Anthracene	U	ND	3430	13200	ug/kg	40.					
Benzo(a)anthracene	U	ND	2640	13200	ug/kg	40.					
Benzo(a)pyrene	U	ND	2900	13200	ug/kg	40.					
Benzo(b)fluoranthene	U	ND	5680	13200	ug/kg	40.					
Benzo(ghi)perylene	U	ND	3170	13200	ug/kg	40.					
Benzo(k)fluoranthene	U	ND	5280	13200	ug/kg	40.					
Chrysene	U	ND	2110	13200	ug/kg	40.					
Dibenzo(a,h)anthracene	U	ND	3300	13200	ug/kg	40.					
Fluoranthene	U	ND	2640	13200	ug/kg	40.					
Fluorene		14400	4490	13200	ug/kg	40.					
Indeno(1,2,3-c,d)pyrene	U	ND	3170	13200	ug/kg	40.					
Naphthalene		16100	6200	13200	ug/kg	40.					
Phenanthrene		29800	2380	13200	ug/kg	40.					
Pyrene	U	ND	2900	13200	ug/kg	40.					

The following prep procedures were performed:
GC/MS Volatiles (8260 High Level)

JEB 08/30/98 0900 129984 3

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9808866-03



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TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 02, 1998

Page 2 of 3

Sample ID : SPORT0784-3

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
GC/MS Base/Neutral Compounds							RDH	08/26/98	2015	129634	4

Comments:

Data reported in mass/mass units is reported 'as received'.

Surrogate Recovery	Test	Percent %	Acceptable Limits
2-Fluorobiphenyl	M610	0.00*	(30.0 - 115.)
Nitrobenzene-d5	M610	564.*	(23.0 - 120.)
p-Terphenyl-d14	M610	0.00*	(37.3 - 128.)
Bromofluorobenzene	BTEX+NAP-8260B	93.9	(53.5 - 154.)
Dibromofluoromethane	BTEX+NAP-8260B	81.3	(63.4 - 136.)
Toluene-d8	BTEX+NAP-8260B	93.0	(72.1 - 137.)

M = Method	Method-Description
M 1	SW846 8260B
M 2	EPA 8270
M 3	EPA 5035
M 4	EPA 3550

Notes:

The qualifiers in this report are defined as follows:

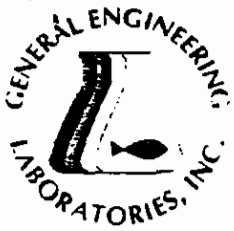
ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.





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NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 02, 1998

Page 3 of 3

Sample ID : SPORT0784-3

M = Method

Method-Description

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Reviewed By

Karen Blakeney



WC 00197

General Engineering Laboratories, Inc.
2040 Savage Road
Charleston, South Carolina 29407
P.O. Box 30712
Charleston, South Carolina 29417
(803) 556-8171

CHAIN OF CUSTODY RECORD

Page 1 of 1

9808866%

Client Name/Facility Name			Collected by/Company			# OF CONTAINERS	SAMPLE ANALYSIS REQUIRED (x) - use remarks area to specify specific compounds or methods																Remarks		
SAMPLE ID	DATE	TIME	WELL	SOIL	COMP		GRAB	pH, conductivity	TOC/DOC	TOX	Chloride, Fluoride, Sulfide	Nitrite/Nitrate	VOC - Specify Method required	METALS - specify	Pesticide	Herbicide	Total Phosol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Caliform - specify type	BTX-HAP	PAH	
SPORT0784-1	8/25/98	0800	X				4																✓	✓	B46 Under Fill Pipe
SPORT0784-2	8/25/98	0730	X				1																✓		Trip Blank
SPORT0784-3	8/25/98	0900	X				4																✓	✓	Fill Pipe Couple Below Tank
SPORT0784-4	8/25/98	0900	X																						Fill Pipe Couple



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1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 1 of 3

Sample ID : SPORT0788-1
Lab ID : 9809045-01
Matrix : Soil
Date Collected : 09/01/98
Date Received : 09/01/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX + NAPTH. - 5 items											
Benzene		5260	680	1360	ug/kg	500	TCL	09/09/98	1407	130654	
Ethylbenzene		47000	408	1360	ug/kg	500					
Naphthalene		50400	816	1360	ug/kg	500					
Toluene		21100	1220	1360	ug/kg	500					
Xylenes (TOTAL)		90400	952	2720	ug/kg	500					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	ND	32000	66600	ug/kg	200	JCB	09/08/98	1625	130324	2
Acenaphthylene	U	ND	29300	66600	ug/kg	200					
Anthracene	U	ND	17300	66600	ug/kg	200					
Benzo(a)anthracene	U	ND	13300	66600	ug/kg	200					
Benzo(a)pyrene	U	ND	14700	66600	ug/kg	200					
Benzo(b)fluoranthene	U	ND	28600	66600	ug/kg	200					
Benzo(ghi)perylene	U	ND	16000	66600	ug/kg	200					
Benzo(k)fluoranthene	U	ND	26600	66600	ug/kg	200					
Chrysene	U	ND	10700	66600	ug/kg	200					
Dibenzo(a,h)anthracene	U	ND	16700	66600	ug/kg	200					
Fluoranthene	U	ND	13300	66600	ug/kg	200					
Fluorene	U	ND	22600	66600	ug/kg	200					
Indeno(1,2,3-c,d)pyrene	U	ND	16000	66600	ug/kg	200					
Naphthalene	U	ND	31300	66600	ug/kg	200					
Phenanthrene	U	ND	12000	66600	ug/kg	200					
Pyrene	U	ND	14700	66600	ug/kg	200					

The following prep procedures were performed:

MS Volatiles (8260 High Level)

TCL 09/02/98 1038 130654 3

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9809045-01





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NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 2 of 3

Sample ID : SPORT0788-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
GC/MS Base/Neutral Compounds							CPU	09/03/98	0045	130324	4

Comments:

A dilution was required for Extractable Organics due to matrix interference. As a result, the detection limits are elevated.

Data reported in mass/mass units is reported 'as received'

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	0.00*	(30.0 - 115.)
Nitrobenzene-d5	M610	0.00*	(23.0 - 120.)
p-Terphenyl-d14	M610	0.00*	(37.3 - 128.)
Bromofluorobenzene	BTEX+NAP-8260B	101.	(53.5 - 154.)
Dibromofluoromethane	BTEX+NAP-8260B	82.4	(63.4 - 136.)
Toluene-d8	BTEX+NAP-8260B	121.	(72.1 - 137.)

M = Method	Method-Description
M 1	SW846 8260B
M 2	EPA 8270
M 3	EPA 5035
M 4	EPA 3550

Notes:

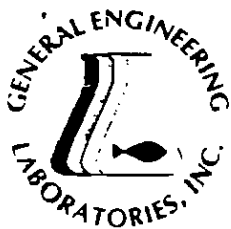
The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.



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STATE	GEL	EPI
FL	E87156/87294	E87472/87
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
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1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 3 of 3

Sample ID : SPORT0788-1

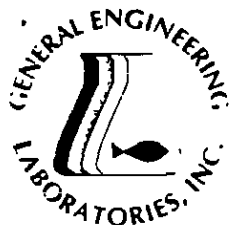
M = Method	Method-Description
------------	--------------------

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Reviewed By

Karen Blakeney





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STATE	GEL	EPI
FL	E87156/87294	E87472/8
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
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1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 1 of 2

Sample ID : SPORT0788-2
Lab ID : 9809045-02
Matrix : Soil
Date Collected : 09/01/98
Date Received : 09/01/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX + NAPTH. - 5 items											
Benzene	U	ND	0.500	1.00	ug/kg	1.0	TCL	09/04/98	2302	130654	
Ethylbenzene	J	0.520	0.300	1.00	ug/kg	1.0					
Naphthalene	U	ND	0.600	1.00	ug/kg	1.0					
Toluene		1.66	0.900	1.00	ug/kg	1.0					
Xylenes (TOTAL)		2.66	0.700	2.00	ug/kg	1.0					

The following prep procedures were performed:

GC/MS Volatiles (8260 High Level)

TCL 09/02/98 1055 130654 2

Comments:

Data reported in mass/mass units is reported 'as received'.

Surrogate Recovery	Test	Percent%	Acceptable Limits
Bromofluorobenzene	BTEX+NAP-8260B	98.9	(53.5 - 154.)
Dibromofluoromethane	BTEX+NAP-8260B	81.6	(63.4 - 136.)
Toluene-d8	BTEX+NAP-8260B	72.1	(72.1 - 137.)

M = Method	Method-Description
M 1	SW846 8260B
M 2	EPA 5035





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SC	10120	10582
TN	02934	02934

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Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

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Sample ID : SPORT0788-2

M = Method

Method-Description

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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standard operating procedures. Please direct
any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
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FL	E87156/87294	E87472/87
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

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Report Date: September 10, 1998

Page 1 of 3

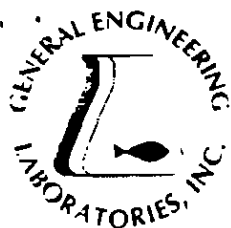
Sample ID : SPORT0788-3
Lab ID : 9809045-03
Matrix : Soil
Date Collected : 09/01/98
Date Received : 09/01/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>BTEX + NAPTH. - 5 items</i>											
Benzene	U	ND	0.620	1.24	ug/kg	1.0	TCL	09/08/98	1355	130654	
Ethylbenzene	U	ND	0.372	1.24	ug/kg	1.0					
Naphthalene	J	0.831	0.744	1.24	ug/kg	1.0					
Toluene	J	1.13	1.12	1.24	ug/kg	1.0					
Xylenes (TOTAL)	J	1.18	0.868	2.48	ug/kg	1.0					
Extractable Organics											
<i>Polynuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	ND	160	333	ug/kg	1.0	JCB	09/08/98	1530	130324	2
Acenaphthylene	U	ND	147	333	ug/kg	1.0					
Anthracene	U	ND	86.6	333	ug/kg	1.0					
Benzo(a)anthracene	U	ND	66.6	333	ug/kg	1.0					
Benzo(a)pyrene	U	ND	73.3	333	ug/kg	1.0					
Benzo(b)fluoranthene	U	ND	143	333	ug/kg	1.0					
Benzo(ghi)perylene	U	ND	79.9	333	ug/kg	1.0					
Benzo(k)fluoranthene	U	ND	133	333	ug/kg	1.0					
Chrysene	U	ND	53.3	333	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	ND	83.3	333	ug/kg	1.0					
Fluoranthene	U	ND	66.6	333	ug/kg	1.0					
Fluorene	U	ND	113	333	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	ND	79.9	333	ug/kg	1.0					
Naphthalene	U	ND	157	333	ug/kg	1.0					
Phenanthrene	U	ND	59.9	333	ug/kg	1.0					
Pyrene	U	ND	73.3	333	ug/kg	1.0					

The following prep procedures were performed:
GC/MS Volatiles (8260 High Level)

TCL 09/02/98 1042 130654 3





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STATE	GEL	EPI
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NC	233	
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TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 2 of 3

Sample ID : SPORT0788-3

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
GC/MS Base/Neutral Compounds							CPU	09/03/98	0045	130324	4

Comments:

Data reported in mass/mass units is reported 'as received'.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	79.2	(30.0 - 115.)
Nitrobenzene-d5	M610	85.3	(23.0 - 120.)
p-Terphenyl-d14	M610	85.4	(37.3 - 128.)
Bromofluorobenzene	BTEX+NAP-8260B	113.	(53.5 - 154.)
Dibromofluoromethane	BTEX+NAP-8260B	78.5	(63.4 - 136.)
Toluene-d8	BTEX+NAP-8260B	72.8	(72.1 - 137.)

M = Method	Method-Description
M 1	SW846 8260B
M 2	EPA 8270
M 3	EPA 5035
M 4	EPA 3550

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.





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STATE	GEL	EPI
FL	E87156/87294	E87472/87
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

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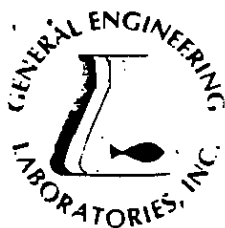
Sample ID : SPORT0788-1

M = Method

Method-Description

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By



GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/874
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 1 of 3

Sample ID : SPORT0788-4
Lab ID : 9809045-04
Matrix : Soil
Date Collected : 09/01/98
Date Received : 09/01/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>BTEX + NAPTH. - 5 items</i>											
Benzene		6620	588	1180	ug/kg	500	TCL	09/09/98	1753	130654	1
Ethylbenzene		44300	353	1180	ug/kg	500					
Naphthalene		45800	705	1180	ug/kg	500					
Toluene		22500	1060	1180	ug/kg	500					
Xylenes (TOTAL)		81500	823	2350	ug/kg	500					
Extractable Organics											
<i>Polynuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	ND	32000	66600	ug/kg	200	JCB	09/08/98	1652	130324	2
Acenaphthylene	U	ND	29300	66600	ug/kg	200					
Anthracene	U	ND	17300	66600	ug/kg	200					
Benzo(a)anthracene	U	ND	13300	66600	ug/kg	200					
Benzo(a)pyrene	U	ND	14700	66600	ug/kg	200					
Benzo(b)fluoranthene	U	ND	28600	66600	ug/kg	200					
Benzo(ghi)perylene	U	ND	16000	66600	ug/kg	200					
Benzo(k)fluoranthene	U	ND	26600	66600	ug/kg	200					
Chrysene	U	ND	10700	66600	ug/kg	200					
Dibenzo(a,h)anthracene	U	ND	16700	66600	ug/kg	200					
Fluoranthene	U	ND	13300	66600	ug/kg	200					
Fluorene	U	ND	22600	66600	ug/kg	200					
Indeno(1,2,3-c,d)pyrene	U	ND	16000	66600	ug/kg	200					
Naphthalene	U	ND	31300	66600	ug/kg	200					
Phenanthrene	U	ND	12000	66600	ug/kg	200					
Pyrene	U	ND	14700	66600	ug/kg	200					

The following prep procedures were performed:
JC/MS Volatiles (8260 High Level)

TCL 09/02/98 1055 130654 3

P O Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29414

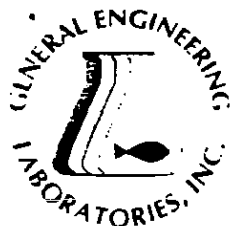
(803) 556-8171 • Fax (803) 766-1178



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9809045-04





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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/8
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 2 of 3

Sample ID : SPORT0788-4

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
GC/MS Base/Neutral Compounds							CPU	09/03/98	0045	130324	4

Comments:

A dilution was required for Extractable Organics due to matrix interference. As a result, the detection limits are elevated.

Data reported in mass/mass units is reported 'as received'.

Surrogate Recovery	Test	Percent %	Acceptable Limits
2-Fluorobiphenyl	M610	0.00*	(30.0 - 115.)
Nitrobenzene-d5	M610	0.00*	(23.0 - 120.)
p-Terphenyl-d14	M610	0.00*	(37.3 - 128.)
Bromofluorobenzene	BTEX+NAP-8260B	101.	(53.5 - 154.)
Dibromofluoromethane	BTEX+NAP-8260B	87.8	(63.4 - 136.)
Toluene-d8	BTEX+NAP-8260B	119.	(72.1 - 137.)

M = Method	Method-Description
M 1	SW846 8260B
M 2	EPA 8270
M 3	EPA 5035
M 4	EPA 3550

Notes:

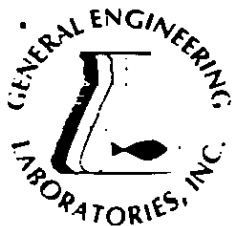
The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.



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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/8
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 3 of 3

Sample ID : SPORT0788-4

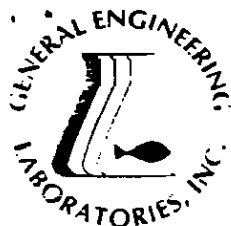
M = Method

Method-Description

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in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Karen Blakeney at (803) 769-7386.


Reviewed By





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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/8745
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 1 of 3

Sample ID : SPORT0788-5
Lab ID : 9809045-05
Matrix : Soil
Date Collected : 09/01/98
Date Received : 09/01/98
Priority : Routine
Collector : Client

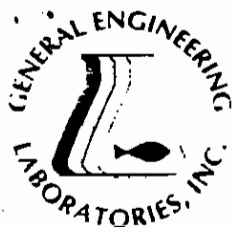
Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>BTEX + NAPTH. - 5 items</i>											
Benzene	J	0.995	0.765	1.53	ug/kg	1.0	TCL	09/08/98	1428	130654	1
Ethylbenzene	U	ND	0.459	1.53	ug/kg	1.0					
Naphthalene	U	ND	0.918	1.53	ug/kg	1.0					
Toluene	U	ND	1.38	1.53	ug/kg	1.0					
Xylenes (TOTAL)	U	ND	1.07	3.06	ug/kg	1.0					
Extractable Organics											
<i>Polynuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	ND	160	333	ug/kg	1.0	JCB	09/08/98	1557	130324	2
Acenaphthylene	U	ND	147	333	ug/kg	1.0					
Anthracene	U	ND	86.6	333	ug/kg	1.0					
Benzo(a)anthracene	U	ND	66.6	333	ug/kg	1.0					
Benzo(a)pyrene	U	ND	73.3	333	ug/kg	1.0					
Benzo(b)fluoranthene	U	ND	143	333	ug/kg	1.0					
Benzo(ghi)perylene	U	ND	79.9	333	ug/kg	1.0					
Benzo(k)fluoranthene	U	ND	133	333	ug/kg	1.0					
Chrysene	U	ND	53.3	333	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	ND	83.3	333	ug/kg	1.0					
Fluoranthene	U	ND	66.6	333	ug/kg	1.0					
Fluorene	U	ND	113	333	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	ND	79.9	333	ug/kg	1.0					
Naphthalene	U	ND	157	333	ug/kg	1.0					
Phenanthrene	U	ND	59.9	333	ug/kg	1.0					
Pyrene	U	ND	73.3	333	ug/kg	1.0					

The following prep procedures were performed:

GC/MS Volatiles (8260 High Level)

TCL 09/02/98 1058 130654 3





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STATE	GEL	EPI
FL	E87156/87294	E87472/874
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 2 of 3

Sample ID : SPORT0788-5

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
GC/MS Base/Neutral Compounds							CPU	09/03/98	0045	130324	4

Comments:

Data reported in mass/mass units is reported 'as received'.

Surrogate Recovery	Test	Percent %	Acceptable Limits
1-Fluorobiphenyl	M610	83.6	(30.0 - 115.)
Nitrobenzene-d5	M610	91.4	(23.0 - 120.)
p-Terphenyl-d14	M610	89.9	(37.3 - 128.)
Bromofluorobenzene	BTEX+NAP-8260B	123.	(53.5 - 154.)
Dibromofluoromethane	BTEX+NAP-8260B	77.4	(63.4 - 136.)
Toluene-d8	BTEX+NAP-8260B	75.0	(72.1 - 137.)

M = Method	Method-Description
M 1	SW846 8260B
M 2	EPA 8270
M 3	EPA 5035
M 4	EPA 3550

Notes:

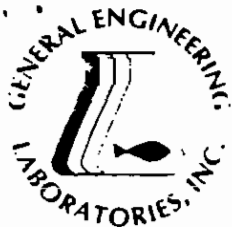
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U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.



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FL	E87156/87294	E87472/87
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 3 of 3

Sample ID : SPORT0788-5

M = Method

Method-Description

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Karen Blakeney
Reviewed By



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FL	E87156/87294	E87472/874
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 1 of 3

Sample ID : SPORT0788-6
Lab ID : 9809045-06
Matrix : Soil
Date Collected : 09/01/98
Date Received : 09/01/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
BTEX + NAPTH. - 5 items											
Benzene		1.81	0.615	1.23	ug/kg	1.0	TCL	09/05/98	0354	130654	1
Ethylbenzene		2.46	0.369	1.23	ug/kg	1.0					
Naphthalene		3.10	0.738	1.23	ug/kg	1.0					
Toluene		3.94	1.11	1.23	ug/kg	1.0					
Xylenes (TOTAL)		5.15	0.861	2.46	ug/kg	1.0					
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	ND	160	333	ug/kg	1.0	JPA	09/03/98	2042	130324	2
Acenaphthylene	U	ND	147	333	ug/kg	1.0					
Anthracene	U	ND	86.6	333	ug/kg	1.0					
Benzo(a)anthracene	U	ND	66.6	333	ug/kg	1.0					
Benzo(a)pyrene	U	ND	73.3	333	ug/kg	1.0					
Benzo(b)fluoranthene	U	ND	143	333	ug/kg	1.0					
Benzo(ghi)perylene	U	ND	79.9	333	ug/kg	1.0					
Benzo(k)fluoranthene	U	ND	133	333	ug/kg	1.0					
Chrysene	U	ND	53.3	333	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	ND	83.3	333	ug/kg	1.0					
Fluoranthene	U	ND	66.6	333	ug/kg	1.0					
Fluorene	U	ND	113	333	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	ND	79.9	333	ug/kg	1.0					
Naphthalene	U	ND	157	333	ug/kg	1.0					
Phenanthrene	U	ND	59.9	333	ug/kg	1.0					
Pyrene	U	ND	73.3	333	ug/kg	1.0					

The following prep procedures were performed:
GC/MS Volatiles (8260 High Level)

TCL 09/02/98 1106 130654 3





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STATE	GEL	EPI
FL	E87156/87294	E87472/87
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 2 of 3

Sample ID : SPORT0788-6

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
GC/MS Base/Neutral Compounds							CPU	09/03/98	0045	130324	4

Comments:

Data reported in mass/mass units is reported 'as received'.

Surrogate Recovery	Test	Percent %	Acceptable Limits
2-Fluorobiphenyl	M610	87.7	(30.0 - 115.)
Nitrobenzene-d5	M610	75.3	(23.0 - 120.)
p-Terphenyl-d14	M610	75.5	(37.3 - 128.)
Bromofluorobenzene	BTEX+NAP-8260B	95.2	(53.5 - 154.)
Dibromofluoromethane	BTEX+NAP-8260B	81.3	(63.4 - 136.)
Toluene-d8	BTEX+NAP-8260B	72.1	(72.1 - 137.)

M = Method	Method-Description
M 1	SW846 8260B
M 2	EPA 8270
M 3	EPA 5035
M 4	EPA 3550

Notes:

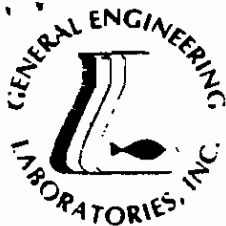
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J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.



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STATE	GEL	EPI
FL	E87156/87294	E87472/874
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 10, 1998

Page 3 of 3

Sample ID : SPORT0788-6

M = Method

Method-Description

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Reviewed By

Karen Blakeney



General Engineering & Manufacturing, Inc.
2040 Savage Road
Charleston, South Carolina 29407
P.O. Box 30712
Charleston, South Carolina 29417
(803) 556-8171

[illegible]

White = sample collector

Yellow = file

Pink := with report

Attachment III

Certificate of Disposal (tank)

UST Certificate of Disposal

CONTRACTOR

Supervisor of Shipbuilding, Conversion and Repair, USN
Portsmouth, VA
Environmental Detachment Charleston
1899 North Hobson Avenue
North Charleston 29405-2106

Telephone (843) 743-6482

TANK ID & LOCATION

UST NH46-5; Building NH46, Turnbull Ave., Charleston Naval Base, N. Charleston, SC

DISPOSAL LOCATION

Bldg. 1601 Tank Cleaning
& Disposal Area
Charleston Naval Complex

TYPE OF TANK

Fuel oil

SIZE (GAL)

1,500 gal.

CLEANING/DISPOSAL METHOD

The tank was cut open on both ends, cleaned with a steam cleaner, cut into sections, and disposed of as recyclable scrap metal.

DISPOSAL CERTIFICATION

I certify that the above tank has been properly cleaned and disposed of as recyclable scrap metal.

Carl Jenkins 1 9/22/98
Carl Jenkins (Date)

APPENDIX B

GEOLOGIC BORING LOGS

BORING LOG

Page 1 of 1

PROJECT NAME: Shipyard Site 29 BORING NUMBER: CNC29B01
 OBJECT NUMBER: NO164 zone C DATE: 5/13/99
 DRILLING COMPANY: Tidelwater GEOLOGIST: Stsco
 DRILLING RIG: Geoprobe DRILLER: Mark Coleman

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION		U S C S *	Remarks	PID/FID Reading (ppm)			
					Soil Density/ Consistency or Rock Hardness	Color			Sample	Sampler BZ	Borehole**	Driller BZ**
	1							2" asphalt	dry	2		
	2				dk brown	Sandy silt		dry	2			
	3				dk brown	Sandy silt		moist	2			
	4		2.5'			Sandy silt		moist	2			
	5				lt brown	Sandy silt		moist	-			
	6				orangish br.	Sandy silt		moist	-			
X	7				orange sh br.	Sandy silt		moist	-			
X	8		3.8'		" "	Sandy silt		moist	2	(HS)		
	9				dk brown	Sandy silt		moist				
	10					Sandy silt		wet				
	11				orange	Sand		saturated				
	12		3.8'		orange	Sand		Saturated				
	13				lt br. orange	Sand		Saturated				
	14				" orange	Sand		saturated				
	15				" orange	Sand		Saturated				
	16		4'		" orange	Sand		Saturated				
					EOB							

When rock coring, enter rock brokenness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: _____

Drilling Area

Background (ppm): 2

Converted to Well: Yes

No

Well I.D. #: _____

BORING LOG

Page 1 of 1

PROJECT NAME: CNC Site 29 Bldg NH46
 PROJECT NUMBER: NO1164 Zone C
 DRILLING COMPANY: 250 / 5700
 DRILLING RIG: 250 / 5700

BORING NUMBER: CNC29-B02
 DATE: 5-13
 GEOLOGIST: 21300
 DRILLER: COLDMAN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION		U S C S *	Remarks	PID/FID Reading (ppm)			
					Soil Density/ Consistency or Rock Hardness	Color			Sample	Sampler BZ	Borehole**	Driller BZ**
	1							2" asphalt				
	2							6" fill material				
	3											
	4		2.2'		dk brown		4	sandy silt				
	5				dk brown			sandy silt				
	6							sandy silt				
X	7				r. dk. br.		4	sandy silt				
X	8		4'		r. dk. br.		4	sandy silt	4		(HS)	
	9				lt. br.			sandy silt				
	10				lt. br.			sandy silt				
	11				lt. br.			sandy silt				
	12		3.8'		lt. br.			sandy silt sand				
					Exp			saturated				

* When rock coring, enter rock brokenness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area
 Background (ppm): 4

Converted to Well: Yes No Well I.D. #:

BORING LOG

Page 1 of 1

PROJECT NAME: Shipyard Site 29 BORING NUMBER: CNC 29 B03
 PROJECT NUMBER: NO 164 Bldg NH46 DATE: 5/13/99
 DRILLING COMPANY: Tidelwater GEOLOGIST: S. G. Co.
 DRILLING RIG: Geoprobe DRILLER: Mark Coleman

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION			U S C S	Remarks	PID/FID Reading (ppm)			
					Soil Density/Consistency or Rock Hardness	Color	Material Classification			Sample	Sampler BZ	Borehole	Driller BZ
	<u>0</u>												
	<u>1</u>						<u>2" asphalt</u>		<u>dry</u>				
	<u>2</u>				<u>dk br</u>		<u>sandy silt</u>		<u>dry</u>				
	<u>3</u>				<u>dk br.</u>		<u>sandy silt</u>		<u>dry</u>				
	<u>4</u>		<u>2.3'</u>		<u>dk br.</u>		<u>sandy silt</u>		<u>dry</u>				
	<u>5</u>				<u>v dk br</u>		<u>sandy silt</u>		<u>dry</u>				
	<u>6</u>				<u>dk reddish</u>		<u>sandy silt</u>		<u>dry</u>				
<u>X</u>	<u>7</u>				<u>brown</u>		<u>sandy silt</u>		<u>dry</u>				
<u>X</u>	<u>8</u>		<u>4'</u>		<u>" "</u>		<u>sandy silt</u>		<u>dry</u>				
	<u>9</u>				<u>orangeish br.</u>		<u>sandy silt</u>		<u>moist</u>				
	<u>10</u>				<u>lt brown</u>		<u>sandy silt</u>		<u>moist</u>				
	<u>11</u>				<u>lt brown</u>		<u>sandy silt</u>		<u>Saturated</u>				
	<u>12</u>		<u>3'6"</u>		<u>lt. brown sand</u>				<u>Saturated</u>				
					<u>END</u>								

In rock coring, enter rock brokenness.

Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: _____

Drilling Area
Background (ppm): 4

Converted to Well: Yes _____ No X Well I.D. #: _____

BORING LOG

Page 1 of 1

PROJECT NAME: CNC Site 29 Bldg NH46
 PROJECT NUMBER: ND164 Zone C
 DRILLING COMPANY: 250/m/5400
 DRILLING RIG: 250/m/5400

BORING NUMBER: CNC 29-B04
 DATE: 5-13
 GEOLOGIST: SISCO
 DRILLER: COLEMAN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION			U S C S *	Remarks	PID/FID Reading (ppm)			
					Soil Density/ Consistency or Rock Hardness	Color	Material Classification			Sample	Sampler BZ	Borehole	Driller BZ
	0												
	1						Asphalt/backfill		dry				
	2				dk. br		Sandy silt		dry	4			
	3				dk. br		sandy silt		moist	12			
	4		2.5				sandy silt		moist	4			
	5				orange		sandy silt		moist				
	6				orangish		sandy silt		moist				
	7				brown		sandy silt		moist	5			
	8		41		"		sandy silt		moist	5			
	9				"		sandy silt		moist				
	10				lt brown		sand		wet				
	11				lt brown		sand		saturated				
	12		41		lt brown		sand		saturated				
					EOB								

* When rock coring, enter rock brokenness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: _____

Drilling Area
 Background (ppm): 4

Converted to Well: Yes _____ No X Well I.D. #: _____

Page 1 of 1

Sample No. and Type or ROD	Depth (Ft.) or Run No.	Blows / 6" or ROD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION		U S C S	Remarks	PID/FID Reading (ppm)				
					Soil Density/Consistency or Rock Hardness	Color			Material Classification	Sample	Sampler BZ	Borehole	Driller BZ
10													
1	/	/						Asphalt	DRY	/			
2	/	/			lt. Brown			Sandy silt	Moist	3.5			
3	/	/			Brown			" "	Moist	3.5			
4	/	/	2.5										
5	/	/											
6	/	/			Brown			Sandy silt, brick rock		1			
7	/	/											
X 8	/	/	1.5										
X 9	/	/			dk br.			sandy silt	moist	100	HS		
10	/	/			dk br.			silty sand	wet	10	WFI		
11	/	/			lt br			sand	Saturated				
12	/	/	4'		lt. br			sand	Saturated				
					EOR								

Well I.D. #:

Page 1 of 1

BORING NUMBER: CNC 29-806
DATE: 5-13
GEOLOGIST: 3150
DRILLER: COLEMAN

Converted to Well:	Yes	No	X	Well I.D. #:
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Well I.D. #:

BORING LOG

Page 1 of 2

PROJECT NAME: CNC Site 29 Bldg NH46 BORING NUMBER: CNC 29-B07
 PROJECT NUMBER: ND164 Zone C DATE: 5-13
 DRILLING COMPANY: 250/5400 GEOLOGIST: 31520
 DRILLER: COLEMAN

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION		U S C S	Remarks	PID/FID Reading (ppm)			
					Soil Density/Consistency or Rock Hardness	Color			Sample	Sampler BZ	Borehole	Driller BZ
	1											
	2											
	3				brown	Sandy Silt		dry				
	4		21		brown	Sandy silt		"		42		
	5					Sandy silt		"				
	6				blk.	2" layer asphalt		dry				
✓	7		2.5'		brown	Sandy silt		dry		2		
✓	8		2.5'		brown	Sandy Silty sand		moist		7		
	9				orange br.	Silty sand		vet				
	10				lt. br	Sand/gravel		saturated				
	11				lt. br.	Sand		saturated				
	12		4'		lt. br.	sand		saturated				
	13				lt br.	Sand		Saturated				
	14				1	Sand		Saturated				
	15					sand		"				
	16		3' 10"			sand		"				
	17											
	18											
	19											
	20		0'									
	21				lt. brown	Silty sand						
	22				gray	Silty sand						
	23				gray	Silty sand lot of shells fragments						
	24		4'		olive	Silty sand "		cohesive.				
	25											

* rock coring, enter rock brokenness.

* include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: _____

Drilling Area
Background (ppm): 2

Converted to Well: Yes _____ No X Well I.D. #: _____

Page 2 of 2

BORING NUMBER: CNC 29-B07, cont.
DATE: 5-13
GEOLOGIST: SJSD
DRILLER: COLEMAN

* When rock coring, enter rock brokenness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Converted to Well:	Yes	No	Well I.D. #:
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Drilling Area

Background (ppm):

Page 1 of 1

BORING NUMBER: CNC 29 - B08
DATE: 5-19
GEOLOGIST: JISC
DRILLER: COLFMAN

[illegible]

*Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area
Background (ppm): **3.5**

Yes

No

Well I.D. #:

Page 1 of 1

BORING NUMBER: CNC29-B09
DATE: 5-17
GEOLOGIST: Sisco
DRILLER: Coleman

Converted to Well:	Yes	No	X	Well I.D. #:
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BORING LOG

Page 1 of 1

PROJECT NAME: CNC Site 29 Bldg NH46
 PROJECT NUMBER: NO164 Zone C
 DRILLING COMPANY: 250/5700

BORING NUMBER: CNC 29-B10
 DATE: 5-14
 GEOLOGIST: SISCO
 DRILLER: COLEMAN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION			U S C S	Remarks	PID/FID Reading (ppm)			
					Soil Density/Consistency or Rock Hardness	Color	Material Classification			Sample	Sampler BZ	Borehole	Driller BZ
	0												
	1						Concrete		DRY				
	2						Crusher-run		↓				
	3				Br.		Sandy silt			4			
	4		3										
	5				Dr.		Sandy silt		DRY	4			
	6				Dr.		Sandy silt		DRY	4			
	7												
	8		2										
	9				Br.		Sandy silt		DRY	4			
	10				Dr. Brown		11 w/ rock frags.		"	4			
	11				"		11 and some brick		Moist	4			
X	12		3										
	13				Dr. Brown		Sandy silt		Moist				
	14				lt. Br		Silty sand		Used				
	15				"		Sand		Saturated				
	16		4		Gray		Sand		Sat.				
					EOB								

Then rock coring, enter rock brokenness.

Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: BOREHOLE LOCATION ON ~ 5 FT. of mixed elevation Drilling Area Background (ppm): 4.5
FOR ROAD TO DOCK @ BLDG.

Converted to Well: Yes X No X Well I.D. #:

Page 1 of 1

BORING NUMBER: CNC 29-B11
DATE: 5-14
GEOLOGIST: SISLO
DRILLER: COLFMAN

Converted to Well: Yes ☒ No ☐ Well I.D. #:

Page 1 of 1

PROJECT NAME:	CNC Site 29 Bldg NH46	BORING NUMBER:	CNC 29-B12
OBJECT NUMBER:	N0164 Zone C	DATE:	5-14
DRILLING COMPANY:		GEOLOGIST:	31500
DRILLING RIG:	250/5400	DRILLER:	COLEMAN

[illegible]

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Converted to Well: Yes No X Well I.D. #:

Drilling Area
Background (ppm): 4

BORING LOG

Page 1 of 1

PROJECT NAME: CNC Site 29 Bldg NH46
 PROJECT NUMBER: ND164 Zone C
 DRILLING COMPANY: 250/5400
 DRILLING RIG: 250/5400

BORING NUMBER: CNC 29-B13
 DATE: 5-14
 GEOLOGIST: Sisco
 DRILLER: COLEMAN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION			U S C S	Remarks	PID/FID Reading (ppm)			
					Soil Density/Consistency or Rock Hardness	Color	Material Classification			Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
	1						asphalt, f: 4		dry	3			
	2				br		sandy silt		moist	3			
	3									3			
	4		2.5							3			
	5									3			
	6									3			
	7									3			
X	8		4							3			
	9				br		silty sand		wet	✓			
	10				light br		sand		set	✓			
	11				tan					✓			
	12		4							✓			
	13												
	14												
				EOB									

* When rock coring, enter rock brokenness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: 10 ft. of screen (14' to 4') at 5 ft. Diser.

Drilling Area
 Background (ppm): 3

Converted to Well: Yes X No Well I.D. #:

PIEZOMETER

BORING LOG

Page 1 of 1

PROJECT NAME: Chas. Naval Complex
 PROJECT NUMBER: N 0164 (Zone C) (Y044)
 DRILLING COMPANY: Custom Drilling
 DRILLING RIG: B-61 Mobile

BORING NUMBER: CNC 31-MW 7D
 DATE: 6/24/99
 GEOLOGIST: Mark Darrington
 DRILLER: Daniel Martin

Sample No. and Type or RQD	Depth (Ft) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft) or Screened Interval	MATERIAL DESCRIPTION			U S C S *	Remarks	PID/FID Reading (ppm)			
					Soil Density/Consistency or Rock Hardness	Color	Material Classification			Sample 1	Sample 2	Borehole	Driller
0	0						No SS samples collected. Orange-brown silty sand, NE-m. am, W sorted, moist-sat.		Orange Petro. Clay				
1	19		24"	19	dk olive-grey		Clay - plastic, cohesup, w/abundant shell hash,		No petro. obs	0	0	0	0
	21						Term. Depth 20'						
							Surface Casing set to 20' b/s.						

* When rock coring, enter rock brokenness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area
 Background (ppm): 0-0

Converted to Well: Yes ☒ No ☐ Well I.D. #: CNC 31-MW

BORING LOG

Page ____ of ____

PROJECT NAME:
PROJECT NUMBER:
DRILLING COMPANY:
DRILLING RIG:

CNC Site 29 Bldg NH46
CNC 29 NO164
Custom Drilling

BORING NUMBER: CNC29-MW07D (MW07D)
DATE: 7/2/99
GEOLOGIST: Marty Ray
DRILLER: Rod

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft) or Screened Interval	MATERIAL DESCRIPTION			U S C S *	Remarks	PID/FID Reading (ppm)			
					Soil Density/Consistency or Rock Hardness	Color	Material Classification			Sample	Sampler	Borehole	Driller
#1	28	6/6	7 6 0.75/2		Firm	olive	top 2" olive silty sand w/ grain well sorted with shell fragments throughout						
		6/6			soft		bottom 6" olive clay cohesive firm with some shell fragments wet.						
	30	4/6											
#2	30	9/6	8 6 2/2		Soft	olive	clay, cohesive with shell fragments throughout, wet.						
		6/6											
	32	5/6			bottom 4"		firm grey sand w/ grain well sorted wet.						
#3	32	14/6	10 6 2/2		top 6"		firm grey sand w/ med grain, poorly sorted wet, lots of shell						
		9/6			bottom 15ft		olive to grey clay plastic cohesive. very firm with some shell fragments 0.0 ppm.						
	34	14/6											
#4	34	12/6	14 6 2/2		top 1' firm		olive clay plastic cohesive, wet some shell fragments						
		15/6			bottom 1' firm		sand with a lot of shell fragments, olive wet 0.0 ppm phosphate flakes and small phosphate rock						
	36	9/6											
#5	36	6/6	0 6 1/2		moderately firm		sand/shell high poorly sorted wet						
		9/6											
	38	11/6			bottom 3'		olive clay, firm, plastic, cohesive moist to wet						

* When rock coring, enter rock brokenness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: _____

Drilling Area
Background (ppm): _____

Converted to Well: Yes _____ No _____ Well I.D. #: _____

BORING NO.: CNC29-MW01

OVERBURDEN MONITORING WELL SHEET

PROJECT	<u>CNC Site 29</u>	LOCATION:	<u>CNC29-MW01</u>	DRILLER	<u>Rod</u>
PROJECT NO.	<u>NO164</u>	BORING	<u>CNC29-MW01</u>	METHOD:	<u>DPT</u>
ELEVATION		DATE	<u>6/15/89</u>	DRILLING	<u>HSM</u>
FIELD GEOLOGIST	<u>Marty Ray</u>			DEVELOPMENT:	<u>NA</u>

	ELEVATION OF TOP OF SURFACE CASING:	
	ELEVATION OF TOP OF RISER PIPE:	
	STICK-UP TOP OF SURFACE CASING:	
	STICK-UP RISER PIPE:	
	I.D. OF SURFACE CASING:	<u>2"</u>
	TYPE OF SURFACE CASING:	<u>sch 40 PVC</u>
	TYPE OF SURFACE SEAL:	<u>concrete</u>
	RISER PIPE I.D.:	<u>2"</u>
	TYPE OF RISER PIPE:	<u>sch 40 PVC</u>
	BOREHOLE DIAMETER:	
	TYPE OF SEAL:	<u>grout 30/65 undergrout</u>
	ELEVATION / DEPTH OF SEAL:	<u>3' 0"</u>
	TYPE OF SEAL:	<u>30/65</u>
	DEPTH TOP OF SAND PACK:	
ELEVATION / DEPTH TOP OF SCREEN:	<u>4' 8 1/2"</u>	
TYPE OF SCREEN:	<u>sch 40 PVC</u>	
SLOT SIZE X LENGTH:	<u>10 slot</u>	
I.D. OF SCREEN:	<u>2"</u>	
TYPE OF SAND PACK:	<u>20/30</u>	
ELEVATION / DEPTH BOTTOM OF SCREEN:	<u>16' 0"</u>	
ELEVATION / DEPTH BOTTOM OF SAND PACK:	<u>16' 6"</u>	
TYPE OF BACKFILL BELOW OBSERVATION WELL:	<u>20/30</u>	
ELEVATION / DEPTH OF HOLE:	<u>16' 6"</u>	

BORING NO.: CNC29-MW02

OVERBURDEN MONITORING WELL SHEET

PROJECT <u>CNC Site 29</u>	LOCATION: <u>CNC29-MW02</u>	DRILLER <u>Rod</u>
PROJECT NO. <u>NO164</u>	BORING <u>CNC29-MW02</u>	METHOD: <u>BPT</u>
ELEVATION _____	DATE <u>6/15/99</u>	DRILLING <u>HSA</u>
FIELD GEOLOGIST <u>Marty Ray</u>		DEVELOPMENT: <u>NA</u>

<p>GROUND ELEVATION</p> <p>7</p>	ELEVATION OF TOP OF SURFACE CASING: _____
	ELEVATION OF TOP OF RISER PIPE: _____
	STICK-UP TOP OF SURFACE CASING: _____
	STICK-UP RISER PIPE: _____
	I.D. OF SURFACE CASING: <u>2"</u>
	TYPE OF SURFACE CASING: <u>sch 40 PVC</u>
	TYPE OF SURFACE SEAL: <u>grout to 10" bls</u>
	RISER PIPE I.D.: <u>2"</u>
	TYPE OF RISER PIPE: <u>sch 40 PVC</u>
	BOREHOLE DIAMETER: _____
	TYPE OF SEAL: <u>30/65 sand</u>
	ELEVATION / DEPTH OF SEAL: <u>3' 0"</u>
	TYPE OF SEAL: <u>30/65</u>
	DEPTH TOP OF SAND PACK: _____
ELEVATION / DEPTH TOP OF SCREEN: <u>6' 0"</u>	
TYPE OF SCREEN: <u>sch 40 PVC</u>	
SLOT SIZE X LENGTH: <u>10 slot</u>	
I.D. OF SCREEN: <u>2"</u>	
TYPE OF SAND PACK: <u>20/30 sand</u>	
ELEVATION / DEPTH BOTTOM OF SCREEN: <u>1' 6"</u>	
ELEVATION / DEPTH BOTTOM OF SAND PACK: _____	
TYPE OF BACKFILL BELOW OBSERVATION WELL: <u>20/30 sand</u>	
ELEVATION / DEPTH OF HOLE: <u>16' 6"</u>	

BORING NO.: CNC29-MW-03

OVERBURDEN MONITORING WELL SHEET

PROJECT	<u>CNC Site 29</u>	LOCATION:	<u>CNC29-MW03</u>	DRILLER	
PROJECT NO.	<u>ND164</u>	BORING	<u>CNC29-MW03</u>	METHOD:	<u>SPT HSA</u>
ELEVATION		DATE	<u>6/15/99</u>	DRILLING	<u>HSA</u>
FIELD GEOLOGIST	<u>Marty Ray</u>			DEVELOPMENT:	<u>NA</u>

	ELEVATION OF TOP OF SURFACE CASING:	
	ELEVATION OF TOP OF RISER PIPE:	
	STICK-UP TOP OF SURFACE CASING:	
	STICK-UP RISER PIPE:	
	I.D. OF SURFACE CASING:	<u>2"</u>
	TYPE OF SURFACE CASING:	<u>sch 40 PVC</u>
	TYPE OF SURFACE SEAL:	<u>grout to 10' bls</u>
	RISER PIPE I.D.:	<u>2"</u>
	TYPE OF RISER PIPE:	<u>2' sch 40 PVC</u>
	BOREHOLE DIAMETER:	
	TYPE OF SEAL:	<u>grout</u>
	ELEVATION / DEPTH OF SEAL:	<u>3' 0"</u>
	TYPE OF SEAL:	<u>3' 0"</u>
	DEPTH TOP OF SAND PACK:	<u>5' 0"</u>
ELEVATION / DEPTH TOP OF SCREEN:	<u>6' 1"</u>	
TYPE OF SCREEN:	<u>10 slot sch 40 PVC</u>	
SLOT SIZE X LENGTH:	<u>10 slot</u>	
I.D. OF SCREEN:	<u>2"</u>	
TYPE OF SAND PACK:	<u>20/30 sand</u>	
ELEVATION / DEPTH BOTTOM OF SCREEN:	<u>16' 2"</u>	
ELEVATION / DEPTH BOTTOM OF SAND PACK:	<u>16' 6"</u>	
TYPE OF BACKFILL BELOW OBSERVATION WELL:	<u>20/30 sand</u>	
ELEVATION / DEPTH OF HOLE:	<u>16' 6"</u>	

BORING NO.: CNC29-MW04

OVERBURDEN MONITORING WELL SHEET

PROJECT <u>CNC Site 29</u>	LOCATION: <u>CNC29-MW04</u>	DRILLER <u>Rod</u>
PROJECT NO. <u>ND164</u>	BORING <u>CNC29-MW04</u>	METHOD: <u>BPT</u>
ELEVATION _____	DATE <u>6/15/99</u>	DRILLING <u>HSA</u>
FIELD GEOLOGIST <u>Marty Ray</u>		DEVELOPMENT: <u>NA</u>

GROUND ELEVATION

ELEVATION OF TOP OF SURFACE CASING: _____

ELEVATION OF TOP OF RISER PIPE: _____

STICK-UP TOP OF SURFACE CASING: _____

STICK-UP RISER PIPE: _____

I.D. OF SURFACE CASING: 2"

TYPE OF SURFACE CASING: 2" sch 40 PVC

TYPE OF SURFACE SEAL: concrete

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: sch 40 PVC

BOREHOLE DIAMETER: _____

TYPE OF SEAL: grout

ELEVATION / DEPTH OF SEAL: 3' 0"

TYPE OF SEAL: 30/65 undergrout

DEPTH TOP OF SAND PACK: _____

ELEVATION / DEPTH TOP OF SCREEN: 6' 11"

TYPE OF SCREEN: sch 40 PVC

SLOT SIZE X LENGTH: 10 slot

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: 20/30

ELEVATION / DEPTH BOTTOM OF SCREEN: 16' 1"

ELEVATION / DEPTH BOTTOM OF SAND PACK: 16' 6"

TYPE OF BACKFILL BELOW OBSERVATION WELL: 20/30

ELEVATION / DEPTH OF HOLE: 16' 6"

OVERBURDEN MONITORING WELL SHEET

PROJECT <u>CNC Site 29</u>	LOCATION: <u>CNC29-MW05</u>	DRILLER
PROJECT NO. <u>NO164</u>	BORING <u>CNC-29-MW05</u>	METHOD: <u>DPT</u>
ELEVATION	DATE <u>6/15/99</u>	DRILLING <u>HSA</u>
FIELD GEOLOGIST <u>Marty Ray</u>		DEVELOPMENT: NA

GROUND ELEVATION

ELEVATION OF TOP OF SURFACE CASING: _____

ELEVATION OF TOP OF RISER PIPE: _____

STICK-UP TOP OF SURFACE CASING: _____

STICK-UP RISER PIPE: _____

I.D. OF SURFACE CASING: 2"

TYPE OF SURFACE CASING: sch 40 PVC

TYPE OF SURFACE SEAL: concrete

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: sch 40 PVC

BOREHOLE DIAMETER: _____

TYPE OF SEAL: grout to 10" bbs

ELEVATION / DEPTH OF SEAL: 2' 10"

TYPE OF SEAL: 30/65

DEPTH TOP OF SAND PACK: _____

ELEVATION / DEPTH TOP OF SCREEN: 5' 0"

TYPE OF SCREEN: sch 40 PVC

SLOT SIZE X LENGTH: 10 slot

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: 20/30

ELEVATION / DEPTH BOTTOM OF SCREEN: 16' 0"

ELEVATION / DEPTH BOTTOM OF SAND PACK: 16' 5"

TYPE OF BACKFILL BELOW OBSERVATION WELL: 20/30

ELEVATION / DEPTH OF HOLE: 16' 5"

OVERBURDEN MONITORING WELL SHEET

PROJECT <u>CNC</u> Site <u>29</u>	LOCATION: <u>CNC29-MW06</u>	DRILLER <u>Rod</u>
PROJECT NO. <u>CNC ND164</u>	BORING <u>CNC29-MW06</u>	METHOD: <u>BPT</u>
ELEVATION _____	DATE <u>6/15/99</u>	DRILLING <u>HSA</u>
FIELD GEOLOGIST <u>Marty Ray</u>		DEVELOPMENT: <u>NA</u>

GROUND ELEVATION

ELEVATION OF TOP OF SURFACE CASING: _____

ELEVATION OF TOP OF RISER PIPE: _____

STICK-UP TOP OF SURFACE CASING: _____

STICK-UP RISER PIPE: _____

I.D. OF SURFACE CASING: 2"

TYPE OF SURFACE CASING: sch 40 pvc

TYPE OF SURFACE SEAL: concrete

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: sch 40 pvc

BOREHOLE DIAMETER: 2"

TYPE OF SEAL: grout to 10"

ELEVATION / DEPTH OF SEAL: 2' 7" MR

TYPE OF SEAL: 30/65

DEPTH TOP OF SAND PACK: 5' 0"

ELEVATION / DEPTH TOP OF SCREEN: 6' 1"

TYPE OF SCREEN: sch 40 PVC

SLOT SIZE X LENGTH: 10 slot

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: 20/30 sand

ELEVATION / DEPTH BOTTOM OF SCREEN: 16' 1"

ELEVATION / DEPTH BOTTOM OF SAND PACK: 16' 7"

TYPE OF BACKFILL BELOW OBSERVATION WELL: 20/30

ELEVATION / DEPTH OF HOLE: 16' 7"

BORING NO.: _____

OVERBURDEN MONITORING WELL SHEET

PROJECT	CNC Site 29	LOCATION:	CNC29-MW07D	DRILLER	Custom Drilling
PROJECT NO.	CNC29 ND164	BORING	CNC29-MW07D	METHOD:	DPT
ELEVATION		DATE	7/2/99	DRILLING	Mud Rotary
FIELD GEOLOGIST	Marty Ray			DEVELOPMENT:	NA

	ELEVATION OF TOP OF SURFACE CASING:	Flush
	ELEVATION OF TOP OF RISER PIPE:	
	STICK-UP TOP OF SURFACE CASING:	
	STICK-UP RISER PIPE:	
	I.D. OF SURFACE CASING:	6"
	TYPE OF SURFACE CASING:	Sch 40 PVC to 20' b/s
	TYPE OF SURFACE SEAL:	concrete pad 2'x2'x6"
	RISER PIPE I.D.:	2"
	TYPE OF RISER PIPE:	Sch 40 PVC
	BOREHOLE DIAMETER:	5 1/8"
	TYPE OF SEAL:	grout to 8' b/s
	ELEVATION / DEPTH OF SEAL:	31' 8"
	TYPE OF SEAL:	30/65 sand
	DEPTH TOP OF SAND PACK:	32' 9"
	ELEVATION / DEPTH TOP OF SCREEN:	33' 0"
TYPE OF SCREEN:	Sch 40 PVC	
SLOT SIZE X LENGTH:	10 slot x 5'	
I.D. OF SCREEN:	2"	
TYPE OF SAND PACK:	20/30 sand	
ELEVATION / DEPTH BOTTOM OF SCREEN:	46' 10"	
ELEVATION / DEPTH BOTTOM OF SAND PACK:	41' 10"	
TYPE OF BACKFILL BELOW OBSERVATION WELL:	20/30 sand	
ELEVATION / DEPTH OF HOLE:	46' 10"	

OVERBURDEN MONITORING WELL SHEET

PROJECT Chas. Abbot Complex LOCATION: Site 3 / Zone C DRILLER Custom Drilling
 PROJECT NO. N0164/Zone C/NW 46 BORING CNC 29 - mwo 670 METHOD: HSA
 ELEVATION _____ DATE 6/21/99 DRILLING Danell Martin
 FIELD GEOLOGIST Mark Darrington DEVELOPMENT: _____
 Boring Methods: Surface Casing; HSA B-25 / Inner Casing

	ELEVATION OF TOP OF SURFACE CASING:	_____
	ELEVATION OF TOP OF RISER PIPE:	_____
	STICK-UP TOP OF SURFACE CASING:	<u>Flush</u>
	STICK-UP RISER PIPE:	<u>Flush</u>
	I.D. OF SURFACE CASING:	<u>8" ID x 10" OD</u>
	TYPE OF SURFACE CASING:	<u>Steel cover with Bolt-on lid (Flush) (PEMCO)</u>
	TYPE OF SURFACE SEAL:	<u>Concrete pad (Quickcrete) 24" x 24" x 6 in.</u>
	RISER PIPE I.D.:	<u>2-in.</u>
	TYPE OF RISER PIPE:	<u>PVC Sch. 40 Flush Thread</u>
	TYPE OF SURFACE Casing (S.C.):	<u>PVC Sch. 40 / Dia. 6-in.</u>
	BOREHOLE DIAMETER:	_____
	TYPE OF SEAL:	_____
	Borehole Dia.:	<u>12.25-in</u>
	Type of S.C. Seal:	<u>Portland Cement Type I</u>
	ELEVATION / DEPTH OF SEAL:	_____
TYPE OF SEAL:	_____	
Depth of S.C.:	<u>20'</u>	
DEPTH TOP OF SAND PACK:	_____	
ELEVATION / DEPTH TOP OF SCREEN:	<u>1</u>	
TYPE OF SCREEN:	_____	
SLOT SIZE X LENGTH:	_____	
I.D. OF SCREEN:	_____	
TYPE OF SAND PACK:	_____	
ELEVATION / DEPTH BOTTOM OF SCREEN:	<u>1</u>	
ELEVATION / DEPTH BOTTOM OF SAND PACK:	<u>1</u>	
TYPE OF BACKFILL BELOW OBSERVATION WELL:	_____	
ELEVATION / DEPTH OF HOLE:	<u>1</u>	

- FID (ppm)
 S.C. Installation
 - Bk qnd = 0.0
 - Driller B.Z. = 0.0
 - In hole = 0.0

(3) Drums of Soil
 Cuttings.
 (1 263 full & 2 full)

APPENDIX C

FIELD SAMPLING DATA SHEETS

GROUNDWATER SAMPLE LOG SHEET

Page of

Project Site Name: CNC Site 29 Bldg NH46
 Project No.: N0164 Zone C

Sample ID No.: 29GLM0601Sample Location: (ME 29 M0601)Sampled By: C.O.C. No.: Type of Sample: ☐ Domestic Well Data☐ Monitoring Well Data☐ Other Well Type: ☐ QA Sample Type: ☐ Low Concentration☐ High Concentration

SAMPLING DATA:

Date: <u>8 7 99</u>	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: <u>1510</u>	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method:		<u>5.95</u>	<u>.086</u>	<u>27.5</u>	<u>6</u>	<u>1.87</u>	<u>—</u>	

PURGE DATA:

Date: <u>8 7 99</u>	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method:	Initial	<u>6.15</u>	<u>.093</u>	<u>28.7</u>	<u>16</u>	<u>2.57</u>	<u>—</u>	
Monitor Reading (ppm):	1	<u>5.97</u>	<u>.087</u>	<u>27.9</u>	<u>6</u>	<u>1.65</u>	<u>—</u>	
Well Casing Diameter & Material	2	<u>5.97</u>	<u>.087</u>	<u>27.6</u>	<u>8</u>	<u>1.91</u>	<u>—</u>	
Type:	3	<u>5.95</u>	<u>.086</u>	<u>27.5</u>	<u>6</u>	<u>1.87</u>	<u>—</u>	
Total Well Depth (TD): <u>16.37</u>								
Static Water Level (WL): <u>9.67</u>								
One Casing Volume (gal/L): <u>1.1</u>								
Start Purge (hrs): <u>1406</u>								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
<u>BTEX/EDS</u>	<u>HCl</u>	<u>2 x 3 x 40 ml</u>	
<u>PAH</u>	<u>—</u>	<u>2 x 2 1 Hr.</u>	
		<u>MS/MSD tubes</u>	

OBSERVATIONS / NOTES:

5.1
16.37
9.67
6.70

6.70 x .16 = 1.1 gm

Circle if Applicable:

Signature(s):

MS/MSD

Duplicate ID No.:

29GLM0601M

67
 1-6
 67
 .6

7 27 94

CNC 29

Weather: Clear, hot, expected high temp: 100°

Personnel: Jeff Alexander

Equip: peristaltic pump, Horizon

0745 Arrive on site - set-up for purging and groundwater sampling.

0800 Free product (.81') found in MW-1. No

0809 Begin purging ~~MW-1~~ MW-3

Samples taken

W/L: ~~9.47, 6.15~~ ^{9.47, 6.15} TD: ~~16.83~~ ^{16.83} ~~4.44~~ ^{4.44} one vol.: ~~1.14 gal~~ ^{1.14 gal}

	PH	Cond	Temp	Turbidity	DO
Initial	6.02	.064	25.9	9	3.87
1st vol.	5.73	.081	26.2	0	2.45
2nd vol.	5.78	.064	26.5	0	2.64
3rd vol.	5.80	.061	26.6	0	2.61

0807

Begin purging ~~MW-3~~ ^{MW-7}W/L: ~~8.43, 6.15~~ ^{8.43, 6.15} TD: ~~16.31~~ ^{16.31} ~~4.44~~ ^{4.44} one vol.: ~~1.14 gal~~ ^{1.14 gal}

	PH	Cond	Temp	Turbidity	DO
Initial	7.49	.246	24.8	76	2.4
1st vol.	7.90	.228	25.0	8	1.62
2nd vol.	8.09	.227	24.6	4	1.85
3rd vol.	8.15	.226	26.8	40	1.84

0955 End purge MW-3.

110 Sampled MW-3 # 29GLM0301

1245 Sampled MW-7 & Duped it. No. 29GLM0701
29GLM0701M

1330 Exit site.

7-26-89

Weather: Clear High of 96° Heat index 100°R

Personnel: R. Hill

0820 Arrived on site started preparing to purge sample wells.

0847 started MW-4 $w/L = 9.95$ $T/D = 16.24$ $1 vol = 1.05 gal.$

	pH	S.C.	Temp.	Turbid.	D.O.
Init	5.25	.088	26.2	Ø	2.46
1st	5.35	.067	27.0	Ø	1.90
2nd	5.65	0.068	27.4	Ø	2.91
3th					

0849 started MW-5 $w/L = 9.67$ $T/D = 16.37$ $1 vol = 1.1 gal.$

	pH	S.C.	Temp	Turbid	D.O.
Init	5.20	.087	26.6	Ø	2.46-1.93
1st	5.65	.088	27.4	Ø	2.00
2nd	5.67	.080	27.7	Ø	1.72
3th					

0850 started MW-2 $w/L = 10.66$ $T/D = 16.25$ $1 vol = 1.0$

	pH	S.C.	Temp	Turbid	D.O.
Init	5.15	.098	25.5	Ø	3.56
1st	5.09	.064	26.0	Ø	3.00
2nd	5.06	.064	26.2	Ø	2.92
3th					

Note: 8 wells will be sampled for BTEX, Naph, MTBE, EDB & PAH
Sampled MW



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page of Project Site Name: CNC Site 29Sample ID No.: 29GLM0301Project No.: ND164 Bldg NH46Sample Location: CNC29MW03Sampled By: Duplicate: ☐Field Analyst: Blank: ☐Field Form Checked as per QA/QC Checklist (initials): **SAMPLING DATA:**

Date: <u>7 27 99</u>	Color	ORP (mV) <u>Pha</u> (+/- mV)	S.C.	Temp.	Turbidity	DO	Sal.	pH
Time: <u> </u>	(Visual)		(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	(%)	(SU)
Method: <u> </u>		<u>5.80</u>	<u>.061</u>	<u>26.6</u>	<u>0</u>	<u>2.61</u>	<u> </u>	<u> </u>

SAMPLE COLLECTION/ANALYSIS INFORMATION:**Dissolved Oxygen:**Equipment: HACH Digital Titrator OX-DT CHEMetrics (Range: 1-16 mg/L)Analysis Time: 0925

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
<input type="checkbox"/>	1-5 mg/L	200 ml	0.200 N	0.01
<input type="checkbox"/>	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
<u> </u>	x 0.01	= <u> </u> mg/L
<u> </u>	x 0.02	= <u> </u> mg/L

CHEMetrics: 2 mg/LNotes: **Alkalinity:**Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: mg/L)Analysis Time: Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
<input checked="" type="checkbox"/>	10-40 mg/L	100 ml	0.1600 N	0.1	<u>8</u> <u>160</u>	x 0.1	= <u>16</u> mg/L
<input type="checkbox"/>	40-160 mg/L	25 ml	0.1600 N	0.4	<u> </u>	x 0.4	= <u> </u> mg/L
<input type="checkbox"/>	100-400 mg/L	100 ml	1.600 N	1.0	<u> </u>	x 1.0	= <u> </u> mg/L
<input type="checkbox"/>	200-800 mg/L	50 ml	1.600 N	2.0	<u> </u>	x 2.0	= <u> </u> mg/L
<input type="checkbox"/>	500-2000 mg/L	20 ml	1.600 N	5.0	<u> </u>	x 5.0	= <u> </u> mg/L
<input type="checkbox"/>	1000-4000 mg/L	10 ml	1.600 N	10.0	<u> </u>	x 10.0	= <u> </u> mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	<u>0</u>	<u>0</u>	<u>16</u>

CHEMetrics: mg/LNotes: Standard Additions: ☐ Titrant Molarity: Digits Required: 1st.: 2nd.: 3rd.: **Carbon Dioxide:**Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: mg/L)Analysis Time: 0942

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
<input checked="" type="checkbox"/>	10-50 mg/L	200 ml	0.3636 N	0.1
<input checked="" type="checkbox"/>	20-100 mg/L	100 ml	0.3636 N	0.2
<input type="checkbox"/>	100-400 mg/L	200 ml	3.636 N	1.0
<input type="checkbox"/>	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count	Multiplier	Concentration
<u>205</u>	x 0.1	= <u>20.5</u> mg/L
<u>205</u>	x 0.2	= <u>41</u> mg/L
<u> </u>	x 1.0	= <u> </u> mg/L
<u> </u>	x 2.0	= <u> </u> mg/L

CHEMetrics: mg/LNotes: Standard Additions: ☐ Titrant Molarity: Digits Required: 1st.: 2nd.: 3rd.:



FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

7-2795

Page of

Project Site Name: <u>CNC29</u>	Sample ID No.: <u>29GFM0301</u>
Project No.: <u>NO164</u>	Sample Location: <u>CNC29MW3</u>
Sampled By: _____	Duplicate: <input type="checkbox"/>
Field Analyst: _____	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): <u> </u>	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide (S^{2-}):

Equipment: DR-700	DR-8 <u>40</u>	HS-C Color Chart	HS-WR Color Wheel	Analysis Time: <u>0955</u>
Program/Module: 610nm	93	Other: _____		
Concentration: <u>0.01</u> mg/L				Filtered: <input type="checkbox"/>
Notes: _____				

Sulfate (SO_4^{2-}):

Equipment: DR-700	DR-8 <u>9</u>	Other: _____	Analysis Time: _____
Program/Module: 91			
Concentration: _____ mg/L	Filtered: <input type="checkbox"/>		
Standard Solution: <input type="checkbox"/>	Results: _____		
Standard Additions: <input type="checkbox"/>	Digits Required: 0.1ml: _____ 0.2ml: _____ 0.3ml: _____		
Notes: _____			

Nitrite (NO_2^- -N):

Equipment: DR-700	DR-8 <u>49</u>	Other: _____	Analysis Time: <u>1020</u>
Program/Module: 60	Filtered: <input type="checkbox"/>		
Concentration: <u>0.025</u> mg/L	Reagent Blank Correction: <input type="checkbox"/>		
		Standard Solution: <input type="checkbox"/>	Results: <input type="checkbox"/>
Notes: _____			

Nitrate (NO_3^- -N):

Equipment: DR-700	DR-8 <u> </u>	Other: _____	Analysis Time: _____
Program/Module: 55	Filtered: <input type="checkbox"/>		
Concentration: _____ mg/L	Nitrite Interference Treatment: <input type="checkbox"/>		
		Reagent Blank Correction: <input type="checkbox"/>	
Standard Solution: <input type="checkbox"/>	Results: _____		
Standard Additions: <input type="checkbox"/>	Digits Required: 0.1ml: _____ 0.2ml: _____ 0.3ml: _____		
Notes: _____			



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page of Project Site Name: CNC Site 30Sample ID No.: 3064m0101Project No.: N0164 Bldg NH46Sample Location: CNC 80 mwsSampled By: Duplicate: ☐Field Analyst: Blank: ☐Field Form Checked as per QA/QC Checklist (initials): **SAMPLING DATA:**

Date: <u>8 22 99</u>	Color	ORP (Eh)	S.C.	Temp.	Turbidity	DO	Sal.	pH
Time: <u> </u>	(Visual)	(+/- mv)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	(%)	(SU)
Method: <u> </u>								

SAMPLE COLLECTION/ANALYSIS INFORMATION:**Dissolved Oxygen:**Equipment: HACH Digital Titrator OX-DT CHEMetrics (Range: 0-1 mg/L)Analysis Time: 1044

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
<input type="checkbox"/>	1-5 mg/L	200 ml	0.200 N	0.01
<input type="checkbox"/>	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
<u> </u>	x 0.01	= <u> </u> mg/L
<u> </u>	x 0.02	= <u> </u> mg/L

CHEMetrics: 0.4 mg/LNotes: **Alkalinity:**Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: mg/L)Analysis Time: 1035Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
<input checked="" type="checkbox"/>	10-40 mg/L	100 ml	0.1600 N	0.1	<u>450</u>	x 0.1	= <u>45</u> mg/L
<input type="checkbox"/>	40-160 mg/L	25 ml	0.1600 N	0.4	<u>120</u>	x 0.4	= <u>48</u> mg/L
<input type="checkbox"/>	100-400 mg/L	100 ml	1.600 N	1.0	<u> </u>	x 1.0	= <u> </u> mg/L
<input type="checkbox"/>	200-800 mg/L	50 ml	1.600 N	2.0	<u> </u>	x 2.0	= <u> </u> mg/L
<input type="checkbox"/>	500-2000 mg/L	20 ml	1.600 N	5.0	<u> </u>	x 5.0	= <u> </u> mg/L
<input type="checkbox"/>	1000-4000 mg/L	10 ml	1.600 N	10.0	<u> </u>	x 10.0	= <u> </u> mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	<u>0</u>	<u>0</u>	<u>48</u>

CHEMetrics: mg/LNotes: Standard Additions: ☐ Titrant Molarity: Digits Required: 1st.: 2nd.: 3rd.: **Carbon Dioxide:**Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: mg/L)Analysis Time: 1040

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
<input type="checkbox"/>	10-50 mg/L	200 ml	0.3636 N	0.1
<input checked="" type="checkbox"/>	20-100 mg/L	100 ml	0.3636 N	0.2
<input type="checkbox"/>	100-400 mg/L	200 ml	3.636 N	1.0
<input type="checkbox"/>	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count	Multiplier	Concentration
<u>440</u>	x 0.1	= <u> </u> mg/L
<u> </u>	x 0.2	= <u>88</u> mg/L
<u> </u>	x 1.0	= <u> </u> mg/L
<u> </u>	x 2.0	= <u> </u> mg/L

CHEMetrics: mg/LNotes: Standard Additions: ☐ Titrant Molarity: Digits Required: 1st.: 2nd.: 3rd.: 49
80.0
-2



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page ___ of ___

Project Site Name: <u>CNC Site 30</u>		Sample ID No.: <u>30GLA0101</u>	
Project No.: <u>N0164 Bldg NH46</u>		Sample Location: _____	
Sampled By: _____		Duplicate: <input type="checkbox"/>	
Field Analyst: _____		Blank: <input type="checkbox"/>	
Field Form Checked as per QA/QC Checklist (initials): <u>[Signature]</u>			
SAMPLE COLLECTION/ANALYSIS INFORMATION:			
Sulfide (S^{2-}):			
Equipment: DR-700	DR-890	HS-C Color Chart	HS-WR Color Wheel
Program/Module: 610nm	93	Other: _____	
Concentration: <u>0.80</u> mg/L		Analysis Time: <u>10:55</u>	
Filtered: <input type="checkbox"/>			
Notes: <u>"LIMIT" REACHED ON DR890. Sample v. blue after adding reagents.</u>			
Sulfate (SO_4^{2-}):			
Equipment: DR-700	DR-8	Other: _____	
Program/Module: _____	91	Analysis Time: _____	
Concentration: _____ mg/L		Filtered: <input type="checkbox"/>	
Standard Solution: <input type="checkbox"/>	Results: _____		
Standard Additions: <input type="checkbox"/>	Digits Required: 0.1ml: _____ 0.2ml: _____ 0.3ml: _____		
Notes: _____			
Nitrite (NO_2^--N):			
Equipment: DR-700	DR-8	Other: _____	
Program/Module: _____	60	Analysis Time: <u>11:25</u>	
Concentration: <u>0.003</u> mg/L		Filtered: <input type="checkbox"/>	
		Reagent Blank Correction: <input type="checkbox"/>	
		Standard Solution: <input type="checkbox"/> Results: <input type="checkbox"/>	
Notes: _____			
Nitrate (NO_3^--N):			
Equipment: DR-700	DR-8	Other: _____	
Program/Module: _____	55	Analysis Time: _____	
Concentration: _____ mg/L		Filtered: <input type="checkbox"/>	
		Nitrite Interference Treatment: <input type="checkbox"/>	
		Reagent Blank Correction: <input type="checkbox"/>	
Standard Solution: <input type="checkbox"/>	Results: _____		
Standard Additions: <input type="checkbox"/>	Digits Required: 0.1ml: _____ 0.2ml: _____ 0.3ml: _____		
Notes: _____			

Title block is initialized by person who performed the QA/QC Checklist: ☒

Standard Additions:	<input type="text"/>	Titrant Molarity:	Digits Required: 1st.:	2nd.:	3rd.:
---------------------	----------------------	-------------------	------------------------	-------	-------



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page of Project Site Name: CNC Site 30Sample ID No.: 309Lm0501Project No.: NO164 Bldg NH46Sample Location: CNC30mwp5Sampled By: JADuplicate: ☐Field Analyst: JABlank: ☐Field Form Checked as per QA/QC Checklist (initials): **SAMPLE COLLECTION/ANALYSIS INFORMATION:****Sulfide (S^{2-}):**Equipment: DR-700 DR-8 HS-C Color Chart HS-WR Color Wheel Analysis Time: 0907Program/Module: 610nm 93 Other: Concentration: 0.01 mg/L Filtered: ☐Notes: **Sulfate (SO_4^{2-}):**Equipment: DR-700 DR-8 Other: Analysis Time: Program/Module: 91Concentration: mg/L Filtered: ☐Standard Solution: ☐ Results: Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml: Notes: **Nitrite (NO_2^- -N):**Analysis Time: 0940Equipment: DR-700 DR-8 Other: Filtered: ☐Program/Module: 60Concentration: 0.010 mg/L Reagent Blank Correction: ☐Standard Solution: ☐ Results: ☐Notes: **Nitrate (NO_3^- -N):**Analysis Time: Equipment: DR-700 DR-8 Other: Filtered: ☐Program/Module: 55Concentration: mg/L Nitrite Interference Treatment: ☐Standard Solution: ☐ Results: Reagent Blank Correction: ☐Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml: Notes:



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page of

Project Site Name: CNC Site 30

Sample ID No.:

Project No.: N0164 Bldg NH46

Sample Location:

Sampled By:

Duplicate: ☐

Field Analyst:

Blank: ☐

Field Form Checked as per QA/QC Checklist (initials): JA

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Manganese (Mn²⁺):

Equipment: DR-700 DR-8 HACH MN-5 Other: Analysis Time: 0920

Program/Module: 525nm 41

Concentration: 0.0 mg/L

Filtered: ☐

Digestion: ☐

Standard Solution: ☐

Results:

Reagent Blank Correction: ☐

Standard Additions: ☐

Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes:

Ferrous Iron (Fe²⁺):

Equipment: DR-700 DR-8 IR-18C Color Wheel Other: Analysis Time: 0915

Program/Module: 500nm 33

Concentration: 0.81 mg/L

Filtered: ☐

Notes:

Hydrogen Sulfide (H₂S):

Equipment: HS-C Other: Analysis Time:

Concentration: 0.0 mg/L

Exceeded 5.0 mg/L range on color chart: ☐

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☒

Correct measurement units are cited in the SAMPLING DATA block: ☒

Multiplication is correct for each *Multiplier* table: ☒

Final calculated concentration is within the appropriate *Range Used* block: ☒

Alkalinity *Relationship* is determined appropriately as per manufacturer instructions: ☒

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☒

Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☒

Title block is initialized by person who performed the QA/QC Checklist: ☒

APPENDIX D

SOIL AND GROUNDWATER LABORATORY ANALYTICAL DATA

SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
TETRA TECH NUS
CASE CNC CHARLESTON

Sample Receipt

The following samples were received on June 2, 1999 and were logged in under Katahdin Analytical Services work order number WP2703 for a hardcopy due date of July 2, 1999.

KATAHDIN <u>Sample No.</u>	TTNUS <u>Sample Identification</u>	GEL <u>Sample No.</u>
WP2703-1	29SLB040708	
WP2703-2	29SLB05089	
WP2703-3	29SLB050809D	
WP2703-5	29SLB070708	
WP2703-6	29SLB110708	
WP2703-7	29SLB120708	
WP2703-8	29E00301	
WP2703-9	29F00301	
WP2703-10	29SLB060809	9906058-01
WP2703-11	29T00301	

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

Sample analyses have been performed by the methods as noted herein.

Volatile Organic Analysis

Two aqueous and seven soil samples were received by the Katahdin Analytical Services, Inc. GC/MS laboratory on June 2, 1999 and were specified to be analyzed by USEPA method 8260B for the analytes benzene, toluene, ethylbenzene, xylenes, MTBE, naphthalene, and EDB.

Analyses for this workorder were performed on the 5972-F and 5972-Z instruments. A VSTD050 (50 ppb standard) was used for the continuing calibration standard. Internal standard and surrogate compounds were also spiked at 50 ug/l.

Batch QC (VBLK, and LCS) was performed in each twelve-hour window. Results are included in this data package. The LCS QC samples were spiked with the entire list of compounds quantitated for at 50 ppb. A matrix spike/matrix spike duplicate pair was analyzed on sample WP2703-10.

Method 8000B, section 7.5.1.2.1 (Revision 2, 12/96) states, "in those instances where the RSD

for one or more analytes exceeds 20%, the initial calibration curve may still be acceptable if the mean of the RSD values for all analytes in the calibration is less than or equal to 20%." Method 8260B narrows this 20% maximum to 15%.

Two initial calibration curves are reported in this workorder. Both calibrations had several analytes exceeding the maximum allowable 15% RSD. The average %RSD for the 5972-F was 13.4%, and the 5972-Z had an average %RSD of 14.9%.

Sample WP2703-1 required reanalysis to confirm matrix interference, both analyses are included. Samples WP2703-2 and 3 were reanalyzed on dilution in order to bring target compounds into the instruments linear range, both diluted and undiluted results are provided.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" (software-generated) on the pertinent quantitation reports. All "M" flags have been dated and initialed by the analyst performing the integration. In addition, all "M" flags have been reviewed and approved by the GC/MS supervisor. Copies of each manual integration are included in the pertinent quantitation reports.

No other protocol deviations were noted by the volatile organics staff.

Semivolatile Organics Extraction and Analysis

Two aqueous and nine soil/sediment samples were received by Katahdin Analytical Services laboratory on June 2, 1999 for analysis in accordance with 8270C for the PAH list of analytes.

Extraction of the aqueous samples occurred following USEPA method 3510 on June 5, 1999. A laboratory control spike consisting of all PAH analytes spiked into organic free water, was extracted in the batch.

Extraction of the soil samples occurred on June 7, 1999, following USEPA method 3550. A laboratory control spike was extracted in the batch, along with a site-specific MS/MSD pair on sample WP2703-10.

The initial calibration curves analyzed in this SDG had some of the target analyte %RSD values exceeding 15 %.

Method 8000B, section 7.5.1.2.1 (Revision 2, 12/96) states, "in those instances where the RSD for one or more analytes exceeds 20%, the initial calibration curve may still be acceptable if the mean of the RSD values for all analytes in the calibration is less than or equal to 20%." Section 7.3.7.1 of method 8270C (revision 3, 12/96) narrows this 20% maximum to 15%.

In the calibration curves analyzed in this SDG, the average %RSD for all analytes was 11.5 and 5.9%, making the curves acceptable.

Analysis of sample WP2703-20 was performed at a 1:20 dilution due to the matrix, resulting in elevated reporting limits for this sample.

Initial analysis of sample WP2703-3 yielded a high recovery of the surrogate nitrobenzene-d5, as well as target analyte concentrations over the upper limit of the calibration curve. Reanalysis occurred at a 1:5 dilution, also with a high recovery of this surrogate. No laboratory action was taken due to the obvious matrix/chromatographic interferences; both sets of data for this sample are included in the data package.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" by the data system. All manual integrations have been dated and initialed by the responsible analyst. Copies of each manual integration are included in the data package. All manual integrations have been reviewed and approved by the GC/MS supervisor.

No other protocol deviations were noted by the semivolatiles organics staff.

Wet Chemistry Analysis

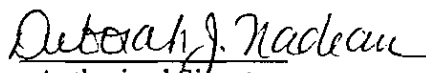
For work order WP2703 the analyses for Total Combustible Organics (TCO) have been performed in accordance with the "Annual Book of ASTM Standards", 1987. Analyses for Solids-Total Residue (TS) for work order WP2703 samples have been performed in accordance with "Contract Laboratory Program Statement of Work for Inorganic Analysis".

All analyses were performed within analytical hold time. No protocol deviations were noted by the Wet Chemistry laboratory staff.

Subcontracted Analysis

Analyses for Total Organic Carbon and Grain size were subcontracted to outside laboratories. Both sets of data are included as separate sections to the data package.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager and/or his designee, as verified by the following signature.


Authorized Signature
7-29-99

KATAHDIN ANALYTICAL SERVICES, INC.

SAMPLE RECEIPT CONDITION REPORT

Tel. (207) 874-2400

Fax (207) 775-4029

LAB (WORK ORDER) # WP2703PAGE: 1 OF 1COOLER: 2 OF 2COC# -SDG# -DATE / TIME RECEIVED: 6-2-99 0920DELIVERED BY: Fed ExRECEIVED BY: SawLIMS ENTRY BY: SawLIMS REVIEW BY / PM: ATCCLIENT: Tetra Tech - SCPROJECT: CNC Charleston

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION		
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> <u>ATC</u>				
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>0.6</u>	<u>ATC notified David Calligan by fax 6/3/99</u>		
6. SAMPLES RECEIVED AT 4°C +/- 2°?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u>			
<u>(ICE)</u> ICE PACKS PRESENT <u>(Y)</u> or N?				(RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)			
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
8. TRIP BLANK PRESENT IN THIS COOLER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A				
13. ANALYTICAL PROGRAMS (CIRCLE ONE)	COMMERCIAL	CLP	HAZWRAP	<u>NFESC</u>	ACOE	AFCEE	OTHER (STATE OF ORIGIN):

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative added.

KATAHAN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT

Tel. (207) 874-2400
Fax (207) 775-4029

LAB (WORK ORDER) # W#2703

PAGE: 1 OF 1

COOLER: 1 OF 2

COC# -

SDG# -

DATE / TIME RECEIVED: 6-2-99 0920

DELIVERED BY: FedEx

RECEIVED BY: Sam

LIMS ENTRY BY: Sam

LIMS REVIEW BY / PM: ACL

CLIENT: Tetra Tech - SC

PROJECT: CNC Charleston

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>1.8</u>	<u>ASC notified Paul Calligan by fax 6/3/99</u>
6. SAMPLES RECEIVED AT 4°C +/- 2? (ICE) ICE PACKS PRESENT (Y or N)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u>	
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
8. TRIP BLANK PRESENT IN THIS COOLER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative added.



340 County Road No. 5
P.O. Box 720
Westbrook, ME 04098
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE PRINT IN PEN

Page ____ of ____

Client	Tetra Tech NUS	Contact		Phone #	() ()	Fax #	() ()
Address	NH 21 Ave. H	City	N. Charleston	State	SC	Zip Code	29405
Purchase Order #		Proj. Name / No.		Katahdin Quote #			

Bill (if different than above)	Address
--------------------------------	---------

Sampler (Print / Sign)	James R. Hill	Copies To:	
------------------------	----------------------	------------	--

LAB USE ONLY	WORK ORDER #: WP2703	ANALYSIS AND CONTAINER TYPE PRESERVATIVES
KATAHDIN PROJECT MANAGER		

REMARKS:	
SHIPPING INFO:	<input checked="" type="checkbox"/> FED EX <input type="checkbox"/> UPS <input type="checkbox"/> CLIENT
AIRBILL NO:	
TEMP °C	<input type="checkbox"/> TEMP BLANK <input type="checkbox"/> INTACT <input type="checkbox"/> NOT INTACT

* Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON
29SLB040708	6-19-99/1415	soil	5	4	1									0
29SLB05089	1/140	"	5	4	1									2000
29SLB050809D	1/140	"	5	4	1									2000
29SLB060809	1/1520	"	6	4	1	1								0
29SLB060809M	1/1520	"	5	4	1									
29SLB060809S	1/1520		5	4	1									
29SLB070708	1/1545		5	4	1									0
29SLB070708	1/1600													
29SLB110708	1/1600		5	4	1									0
29SLB120708	1/1620		5	4	1									0
29EP0301	1/1545		5	2	3	2								
24F0301	1/1615		5	2	3	2								
24T0301	1/		2	2										
	1/													
	1/													
	1/													

COMMENTS

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
James R. Hill	6-19-99/1800	810544185832		6-2-99 0920	Blaney Wilson
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)

KATARDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 1

ORDER NO WP-2703

Project Manager: Andrea J. Colby

REPORT TO: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 06/02/99

PHONE: 850/385-9899

FAX: 850/385-9860

DUE: 02 JUL

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
661 ANDERSEN DRIVE, FOSTER PLAZA VII
PITTSBURGH, PA 15220-2745

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: J. HILL

DELIVERED BY: FEDEX

DISPOSE: AFTER 01 AUG

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WP2703-1	29SLB040708	01 JUN 1415	02 JUN	SL
	WP2703-2	29SLB05089	01 JUN 1440		
	WP2703-3	29SLB050809D	01 JUN 1440		
	WP2703-5	29SLB070708	01 JUN 1545		
	WP2703-6	29SLB110708	01 JUN 1600		
	WP2703-7	29SLB120708	01 JUN 1620		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	6	85.00	510.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	6	135.00	810.00
Solids-Total Residue (TS)	CLP/CIP SO	6	0.00	0.00
TOTALS		6	220.00	1320.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2	WP2703-8	29E00301	01 JUN 1545	02 JUN	AQ
	WP2703-9	29F00301	01 JUN 1615		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	2	75.00	150.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	2	125.00	250.00
TOTALS		2	200.00	400.00

LABORATORY ORDER CONTINUED ON PAGE 2

0000008
Mr Calligan

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 2

ORDER NO WP-2703

Project Manager: Andrea J. Colby
ORDER DATE: 06/02/99
PHONE: 850/385-985
FAX: 850/385-986
DUE: 02 JUL
FAC.ID: CNC CHARLESTON

REPORT TO: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
661 ANDERSEN DRIVE, FOSTER PLAZA VII
PITTSBURGH, PA 15220-2745
PROJECT: CTO #68

PHONE: 412/921-7090
PO: N7912-P99264

SAMPLED BY: J. HILL

DELIVERED BY: FEDEX

DISPOSE: AFTER 01 AUG

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
3	WP2703-10	29SLB060809	01 JUN 1520	02 JUN	SL

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	1	85.00	85.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	135.00	135.00
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Wet Lab Subcontract		1	170.00	170.00
Total Combustible Organics	ASTM D2974	1	30.00	30.00
TOTALS		1	420.00	420.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
4	WP2703-11	29T00301	01 JUN	02 JUN	

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	1	85.00	85.00

ORDER NOTE: QC-IV NFESC-D
DD(KAS007QC-DB3)
CNC CHARLESTON

REPORT COPY: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.
PITTSBURGH, PA 15220
REPORT & DISK

INVOICE: With Report

TOTAL ORDER AMOUNT \$2,225.00
This is NOT an Invoice

AJC/BKR/WEST.AJC(dw)

06-14 Please contact KATAHDIN ANALYTICAL SERVICES promptly if you have any questions

0000009

06/14/99

CASE NARRATIVE
for
Katahdin Analytical
Westbrook, ME
Former Charleston Naval Complex Site
SDG #96058S

June 21, 1999

Laboratory Identification:

General Engineering Laboratories, Inc. (GEL)

Mailing Address:

P.O. Box 30712
Charleston, SC 29417

Express Mail Delivery and Shipping Address:

2040 Savage Rd
Charleston, SC 29414

Telephone Number:

(843) 556-8171

Summary:

Sample receipt

The samples from the former Charleston Naval Complex site arrived at General Engineering Laboratories, Inc., Charleston, SC on June 1 and 2, 1999, for environmental analyses. All sample containers arrived without any visible signs of tampering or breakage. The samples were delivered with chain of custody documentation and signatures.

The following samples were received by the laboratory:

<u>Laboratory Identification</u>	<u>Sample Description</u>
9906058-01	29SLB060809
9906097-01	14SLB020203
9906097-02	14SLB020203D
9906097-03	14SLB050304
9906097-04	15SLB010405



9906097-05	15SLB020405
9906097-06	15SLB020405D
9906097-07	29SLB050809

Case Narrative

Sample analyses were conducted using methodology as outlined in General Engineering Laboratories Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are listed below by analytical parameter.

Internal Chain of Custody:

Custody was maintained for all samples.

Data Package:

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, and General Chemistry.

The following are definitions of reporting limits used at General Engineering Laboratories:

DL Detection Limit: The minimum level of an analyte that can be determined (identified not quantified) with 99% confidence. The values are normally achieved by preparing and analyzing seven aliquots of laboratory water spiked 1 to 5 times the estimated MDL, taking the standard deviation and multiplying it against the one-tailed t-statistic at 99%. This computed value is then verified for reasonableness by repeating the study using the concentration found in the initial study, calculating an F-ratio, and computing the final limit. Sample specific preparation and dilution factors are applied to these limits when they are reported.

The detection limit is the minimum concentration of a substance that can be identified, measured, and reported with 99% confidence that the analyte concentration is above zero. It answers the question "Is It Present."

QL Quantitation Limit: The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The QL is generally 5 to 10 times the MDL. However, it may be nominally chosen within these guidelines to simplify data reporting. For many analytes the QL analyte concentration is selected as the lowest non-zero standard in the calibration curve.

Sample QL's are highly matrix-dependent. Sample specific preparation and dilution factors are applied to these limits when they are reported.

The QL is always \geq DL.



This data package, to the best of my knowledge, is in compliance with technical and administrative requirements.



Valerie S. Davis
Project Manager

fc:saic9906058%



**Case Narrative for
KATA
SDG# 96058S**

TOTAL PETROLEUM HYDROCARBONS

Analytical Batch Number: 151686

Analytical Method: SW846 9071A

<u>Laboratory Number</u>	<u>Sample Description</u>
9906097-01	14SLB020203
9906097-02	14SLB020203D
9906097-05	15SLB020405
9906097-06	15SLB020405D
9906097-07	29SLB050809
QC621595	Blank
QC621596	Laboratory Control Sample
QC621597	Matrix Spike of 9906097-01
QC621598	Duplicate of 9906097-01
QC621599	Matrix Spike of 9906242-01
QC621600	Duplicate of 9906242-01

Instrument Calibration:

The instrument was properly calibrated.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spikes were run on the following Sample Numbers.

9906097-01 and 9906242-01

All analyte recoveries in the matrix spikes were within the required acceptance limits.

Laboratory Control Samples:

All analyte recoveries in the laboratory control sample were within the required acceptance limits.

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

TOTAL ORGANIC CARBON

Analytical Batch Number: 150724

Analytical Method: SW846 9060 Modified

<u>Laboratory Number</u>	<u>Sample Description</u>
9906058-01	29SLB060809
9906097-03	14SLB050304
9906097-04	15SLB010405
QC617934	Blank
QC617935	Duplicate of 9906058-01
QC617936	Post Spike of 9906058-01
QC617937	Laboratory Control Sample

Sample Preparation:

All samples were prepared in accordance with accepted procedures. The method quoted is only for liquid samples. It is modified to handle soils analysis.

Instrument Calibration:

The instrument used was a Dohrmann DC-190 high temperature combustion TOC analyzer with a Dohrmann solids boat sampler. The instrument was properly calibrated on the day of the analysis.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The post spike was run on the following Sample Number.

9906058-01

All analyte recoveries in the post spike were within the required acceptance limits.

Laboratory Control Samples:

All analyte recoveries in the laboratory control sample were within the required acceptance limits.

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

Additional Comments:

TOC solid samples are are tested to determine if inorganic carbon such as carbonates and bicarbonates are present in the sample. If so, the sample is acidified to remove the inorganic carbon, then dried in a low temperature oven. Because the sample portion is dried before analysis, the percent moisture correction is not applied to the TOC solid result.

The preceding narratives have been reviewed by: James M. U Date: 06/27/99

99060587.

[illegible]

White = sample collector Yellow = file Pink = with report



9906097%

Client Name/Facility Name	Katahdin Analytical
Collected by/Company	Tetra tech NUS

	↓	4625
	↓	.2
	↓	.1

White = sample collector Yellow = file Pink = with report

FEDERAL SAMPLE RECEIPT REVIEW

Client KATA

Received by SA

Date 6/2/99

GEL COOLER ☒ GEL POLY COOLER ☐ CLIENT COOLER ☐ OTHER ☐

SAMPLE REVIEW CRITERIA

	YES	NO	COMMENTS/QUALIFIERS
1. Were shipping containers received intact and sealed? If no, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2. Was the Shipment screened following the radiochemistry survey procedure (EPI SOP S-007)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were the survey results negative? If no, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Are any of the samples identified by the client as radioactive? If yes, did client provide RAD activity?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3. Were chain of custody documents included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. Were chain of custody documents completed correctly? (Ink, signed, match containers)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5. Were all sample containers properly labeled?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6. Were proper sample containers received?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7. Preserved samples checked for pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
8. Were samples preserved correctly? If no, list samples & tests	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
9. Shipping container temperature checked?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10. Was shipping container temperature within specifications ($4^{\circ} \pm 2^{\circ} \text{C}$) If no, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4°C
11. Is temperature documented on the Chain of Custody?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
12. Were samples received within holding time? if No, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13. Were VOA vials free of headspace?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
14. ARCO# IF REQUIRED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
15. SDG# IF REQUIRED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

REVIEW Francis

DATE 6/2/99

SA - SEALS ATTACHED NSA - NO SEALS ATTACHED

FEDERAL SAMPLE RECEIPT REVIEW

Client KATA

Received by CG

Date 6/2/99

GEL COOLER___ GEL POLY COOLER___ CLIENT COOLER ☒ OTHER___

SAMPLE REVIEW CRITERIA

	YES	NO	COMMENTS/QUALIFIERS
1. Were shipping containers received intact and sealed? If no, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2. Was the Shipment screened following the radiochemistry survey procedure (EPI SOP S-007)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were the survey results negative? If no, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Are any of the samples identified by the client as radioactive? If yes, did client provide RAD activity?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3. Were chain of custody documents included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. Were chain of custody documents completed correctly? (Ink, signed, match containers)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5. Were all sample containers properly labeled?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6. Were proper sample containers received?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7. Preserved samples checked for pH?	<input type="checkbox"/>	<input type="checkbox"/>	
8. Were samples preserved correctly? If no, list samples & tests	<input type="checkbox"/>	<input type="checkbox"/>	Soil
9. Shipping container temperature checked?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10. Was shipping container temperature within specifications ($4^{\circ}\pm 2^{\circ}$ C) If no, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4°C
11. Is temperature documented on the Chain of Custody?	<input type="checkbox"/>	<input type="checkbox"/>	
12. Were samples received within holding time? if No, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13. Were VOA vials free of headspace?	<input type="checkbox"/>	<input type="checkbox"/>	
14. ARCO# IF REQUIRED	<input type="checkbox"/>	<input type="checkbox"/>	
15. SDG# IF REQUIRED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	96097

REVIEW

Shaner

DATE

6/2/99

SA - SEALS ATTACHED NSA - NO SEALS ATTACHED



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-1
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 93
Method: SW8260
Date Analyzed: 6/4/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB040708	SL	6/1/99	6/2/99	6/4/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<6	ug/Kg	1.3	6	5
TOLUENE	<6	ug/Kg	1.3	6	5
1,2-DIBROMOETHANE	<6	ug/Kg	1.3	6	5
ETHYLBENZENE	<6	ug/Kg	1.3	6	5
NAPHTHALENE	<6	ug/Kg	1.3	6	5
MTBE	<6	ug/Kg	1.3	6	5
TOTAL XYLENES	<6	ug/Kg	1.3	6	5
DIBROMOFLUOROMETHANE	75	%	1.3		
1,2-DICHLOROETHANE-D4	71	%	1.3		
TOLUENE-D8	\$65	%	1.3		
P-BROMOFLUOROBENZENE	70	%	1.3		

Report Notes: \$



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-1RA
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 93
Method: SW8260
Date Analyzed: 6/5/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB040708	SL	6/1/99	6/2/99	6/5/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<6	ug/Kg	1.3	6	5
TOLUENE	<6	ug/Kg	1.3	6	5
1,2-DIBROMOETHANE	<6	ug/Kg	1.3	6	5
ETHYLBENZENE	<6	ug/Kg	1.3	6	5
NAPHTHALENE	<6	ug/Kg	1.3	6	5
MTBE	<6	ug/Kg	1.3	6	5
TOTAL XYLENES	<6	ug/Kg	1.3	6	5
DIBROMOFLUOROMETHANE	81	%	1.3		
1,2-DICHLOROETHANE-D4	77	%	1.3		
LUENE-D8	70	%	1.3		
BROMOFLUOROBENZENE	\$54	%	1.3		

Report Notes: \$



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-2
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 93
Method: SW8260
Date Analyzed: 6/4/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB05089	SL	6/1/99	6/2/99	6/4/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	9	ug/Kg	1.4	7	5
TOLUENE	120	ug/Kg	1.4	7	5
1,2-DIBROMOETHANE	<7	ug/Kg	1.4	7	5
ETHYLBENZENE	E1200	ug/Kg	1.4	7	5
NAPHTHALENE	E550	ug/Kg	1.4	7	5
MTBE	<7	ug/Kg	1.4	7	5
TOTAL XYLENES	E3000	ug/Kg	1.4	7	5
DIBROMOFLUOROMETHANE	91	%	1.4		
1,2-DICHLOROETHANE-D4	99	%	1.4		
TOLUENE-D8	71	%	1.4		
P-BROMOFLUOROBENZENE	151	%	1.4		

Report Notes: E



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-2DL
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 93
Method: SW8260
Date Analyzed: 6/7/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB05089	SL	6/1/99	6/2/99	6/7/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<600	ug/Kgdrywt	120	600	5
TOLUENE	<600	ug/Kgdrywt	120	600	5
1,2-DIBROMOETHANE	<600	ug/Kgdrywt	120	600	5
ETHYLBENZENE	1200	ug/Kgdrywt	120	600	5
NAPHTHALENE	5300	ug/Kgdrywt	120	600	5
MTBE	<600	ug/Kgdrywt	120	600	5
TOTAL XYLENES	3400	ug/Kgdrywt	120	600	5
DIBROMOFLUOROMETHANE	86	%	120		
1,2-DICHLOROETHANE-D4	79	%	120		
OLUENE-D8	88	%	120		
P-BROMOFLUOROBENZENE	82	%	120		

Report Notes: O-2, O-1



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2703-3
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 93
Method: SW8260
Date Analyzed: 6/4/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB050809D	SL	6/1/99	6/2/99	6/4/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	46	ug/Kg	1.5	7	5
TOLUENE	260	ug/Kg	1.5	7	5
1,2-DIBROMOETHANE	<7	ug/Kg	1.5	7	5
ETHYLBENZENE	E1800	ug/Kg	1.5	7	5
NAPHTHALENE	E570	ug/Kg	1.5	7	5
MTBE	<7	ug/Kg	1.5	7	5
TOTAL XYLENES	E4300	ug/Kg	1.5	7	5
DIBROMOFLUOROMETHANE	117	%	1.5		
1,2-DICHLOROETHANE-D4	122	%	1.5		
TOLUENE-D8	99	%	1.5		
P-BROMOFLUOROBENZENE	188	%	1.5		

Report Notes: E



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-3DL
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 93
Method: SW8260
Date Analyzed: 6/7/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB050809D	SL	6/1/99	6/2/99	6/7/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<650	ug/Kgdrywt	130	650	5
TOLUENE	630	ug/Kgdrywt	130	650	5
1,2-DIBROMOETHANE	<650	ug/Kgdrywt	130	650	5
ETHYLBENZENE	3500	ug/Kgdrywt	130	650	5
NAPHTHALENE	5400	ug/Kgdrywt	130	650	5
MTBE	<650	ug/Kgdrywt	130	650	5
TOTAL XYLENES	9000	ug/Kgdrywt	130	650	5
DIBROMOFLUOROMETHANE	88	%	130		
1,2-DICHLOROETHANE-D4	81	%	130		
TOLUENE-D8	86	%	130		
-BROMOFLUOROBENZENE	77	%	130		

Report Notes: J, O-2



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2703-5
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 91
Method: SW8260
Date Analyzed: 6/5/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB070708	SL	6/1/99	6/2/99	6/5/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<6	ug/Kg	1.3	6	5
TOLUENE	<6	ug/Kg	1.3	6	5
1,2-DIBROMOETHANE	<6	ug/Kg	1.3	6	5
ETHYLBENZENE	<6	ug/Kg	1.3	6	5
NAPHTHALENE	<6	ug/Kg	1.3	6	5
MTBE	<6	ug/Kg	1.3	6	5
TOTAL XYLENES	<6	ug/Kg	1.3	6	5
DIBROMOFLUOROMETHANE	100	%	1.3		
1,2-DICHLOROETHANE-D4	99	%	1.3		
TOLUENE-D8	88	%	1.3		
P-BROMOFLUOROBENZENE	67	%	1.3		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-6
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 94
Method: SW8260
Date Analyzed: 6/4/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB110708	SL	6/1/99	6/2/99	6/4/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<7	ug/Kg	1.4	7	5
TOLUENE	<7	ug/Kg	1.4	7	5
1,2-DIBROMOETHANE	<7	ug/Kg	1.4	7	5
ETHYLBENZENE	<7	ug/Kg	1.4	7	5
NAPHTHALENE	J4	ug/Kg	1.4	7	5
MTBE	<7	ug/Kg	1.4	7	5
TOTAL XYLENES	<7	ug/Kg	1.4	7	5
DIBROMOFLUOROMETHANE	96	%	1.4		
1,2-DICHLOROETHANE-D4	97	%	1.4		
OLUENE-D8	79	%	1.4		
-BROMOFLUOROBENZENE	75	%	1.4		

Report Notes: J



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2703-7
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 92
Method: SW8260
Date Analyzed: 6/4/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB120708	SL	6/1/99	6/2/99	6/4/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<6	ug/Kg	1.2	6	5
TOLUENE	<6	ug/Kg	1.2	6	5
1,2-DIBROMOETHANE	<6	ug/Kg	1.2	6	5
ETHYLBENZENE	<6	ug/Kg	1.2	6	5
NAPHTHALENE	<6	ug/Kg	1.2	6	5
MTBE	<6	ug/Kg	1.2	6	5
TOTAL XYLENES	<6	ug/Kg	1.2	6	5
DIBROMOFLUOROMETHANE	108	%	1.2		
1,2-DICHLOROETHANE-D4	106	%	1.2		
TOLUENE-D8	107	%	1.2		
P-BROMOFLUOROBENZENE	110	%	1.2		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-8
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 6/4/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29E00301	AQ	6/1/99	6/2/99	6/4/99	DJP	5030	DJP

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	91	%	1.0		
1,2-DICHLOROETHANE-D4	96	%	1.0		
TOLUENE-D8	92	%	1.0		
BROMOFLUOROBENZENE	84	%	1.0		

port Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2703-9
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 6/4/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29F00301	AQ	6/1/99	6/2/99	6/4/99	DJP	5030	DJP

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	92	%	1.0		
1,2-DICHLOROETHANE-D4	94	%	1.0		
TOLUENE-D8	94	%	1.0		
P-BROMOFLUOROBENZENE	85	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-10
SDG: WP2703
Report Date: 7/2/99
PO No.: N7912-P99264
Project: CTO #68
% Solids: 93
Method: SW8260
Date Analyzed: 6/4/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB060809	SL	6/1/99	6/2/99	6/4/99	DJP	5030	DJP

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<600	ug/Kgdrywt	120	600	5
TOLUENE	<600	ug/Kgdrywt	120	600	5
1,2-DIBROMOETHANE	<600	ug/Kgdrywt	120	600	5
ETHYLBENZENE	<600	ug/Kgdrywt	120	600	5
NAPHTHALENE	<600	ug/Kgdrywt	120	600	5
MTBE	<600	ug/Kgdrywt	120	600	5
TOTAL XYLENES	<600	ug/Kgdrywt	120	600	5
DIBROMOFLUOROMETHANE	92	%	120		
1,2-DICHLOROETHANE-D4	94	%	120		
TOLUENE-D8	93	%	120		
-BROMOFLUOROBENZENE	85	%	120		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2703-11
SDG: WP2703
Report Date: 7/2/99
PO No.: N7912-P99264
Project: CTO #68
% Solids: -
Method: SW8260
Date Analyzed: 6/4/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29T00301	SL	6/1/99	6/2/99	6/4/99	DJP	5030	DJP

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/Kgdrywt	1.0	5	5
TOLUENE	<5	ug/Kgdrywt	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/Kgdrywt	1.0	5	5
ETHYLBENZENE	<5	ug/Kgdrywt	1.0	5	5
NAPHTHALENE	<5	ug/Kgdrywt	1.0	5	5
MTBE	<5	ug/Kgdrywt	1.0	5	5
TOTAL XYLENES	<5	ug/Kgdrywt	1.0	5	5
DIBROMOFLUOROMETHANE	92	%	1.0		
1,2-DICHLOROETHANE-D4	92	%	1.0		
TOLUENE-D8	95	%	1.0		
P-BROMOFLUOROBENZENE	86	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

Summary of Report Notes

Report Note	Note Text
\$	'\$' flag denotes surrogate compound recovery is out of criteria. Re-extraction or re-analysis confirmed matrix interference.
E	'E' flag indicates an estimated value. The analyte was detected in the sample at a concentration greater than the standard calibration range.
J	'J' flag denotes an estimated value less than the Laboratory's Practical Quantitation Level.
O-1	Sample dilution required due to matrix interference, sample viscosity or other matrix-related problem; therefore, standard laboratory Practical Quantitation Level (PQL) could not be achieved.
O-2	Sample dilution required for quantitation of one or more target analytes; therefore, standard laboratory Practical Quantitation Level (PQL) could not be achieved.

2A
WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: Katahdin Analytical Services

SDG No.: WP2703

Matrix: WATER

Client Sample ID	Lab Sample ID	SMC1 (DFM) #	SMC2 (DCA) #	SMC3 (TOL) #	SMC4 (BFB) #	Total Out
LCSF03A	LCSF03A	92	90	94	97	0
VBLKF03B	VBLKF03B	91	92	93	87	0
LCSF04A	LCSF04A	91	95	93	96	0
VBLKF04A	VBLKF04A	92	98	94	88	0
29E00301	WP2703-8	91	96	92	84	0
29F00301	WP2703-9	92	94	94	85	0
LCSF07A	LCSF07A	89	81	86	87	0
VBLKF07A	VBLKF07A	88	80	85	79	0

QC LIMITS

SMC1 (DFM) = DIBROMOFLUOROMETHANE (75-129)
 SMC2 (DCA) = 1,2-DICHLOROETHANE-D4 (65-135)
 SMC3 (TOL) = TOLUENE-D8 (82-120)
 SMC4 (BFB) = P-BROMOFLUOROBENZENE (69-125)

Column to be used to flag recovery value

* Values are outside of QC limits

2A
SOIL VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: Katahdin Analytical Services

SDG No.: WP2703

Matrix: SOIL

Client Sample ID	Lab Sample ID	SMC1 (DFM) #	SMC2 (DCA) #	SMC3 (TOL) #	SMC4 (BFB) #	Total Out
29SLB060809	WP2703-10	92	94	93	85	0
29SLB060809MS	WP2703-10MS	90	92	93	93	0
29SLB060809MSD	WP2703-10MSD	92	92	94	97	0
29T00301	WP2703-11	92	92	95	86	0
29SLB05089DL	WP2703-2DL	86	79	88	82	0
29SLB050809DDL	WP2703-3DL	88	81	86	77	0
LCSZ04A	LCSZ04A	110	115	113	110	0
VBLKZ04A	VBLKZ04A	122	124	113	109	0
29SLB040708	WP2703-1	75	71	65 *	70	1
29SLB05089	WP2703-2	91	99	71	151	0
29SLB050809D	WP2703-3	117	122	99	188 *	1
29SLB110708	WP2703-6	96	97	79	75	0
29SLB120708	WP2703-7	108	106	107	110	0
LCSZ05A	LCSZ05A	105	108	107	109	0
VBLKZ05A	VBLKZ05A	117	116	114	107	0
29SLB040708	WP2703-1RA	81	77	70	54 *	1
29SLB070708	WP2703-5	100	99	88	67	0

QC LIMITS

SMC1 (DFM) = DIBROMOFLUOROMETHANE (69-148)
 SMC2 (DCA) = 1,2-DICHLOROETHANE-D4 (66-149)
 SMC3 (TOL) = TOLUENE-D8 (68-147)
 SMC4 (BFB) = P-BROMOFLUOROBENZENE (64-152)

Column to be used to flag recovery value

* Values are outside of QC limits



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKF03B
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 6/3/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKF03B	AQ	-	-	6/3/99	DJP	5030	DJP

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	91	%	1.0		
1,2-DICHLOROETHANE-D4	92	%	1.0		
TOLUENE-D8	93	%	1.0		
P-BROMOFLUOROBENZENE	87	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKF04A
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 6/4/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKF04A	AQ	-	-	6/4/99	DJP	5030	DJP

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	92	%	1.0		
1,2-DICHLOROETHANE-D4	98	%	1.0		
UENE-D8	94	%	1.0		
BROMOFLUOROBENZENE	88	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKZ04A
SDG: WP2703
Report Date: 7/2/99
PO No.: N7912-P99264
Project: CTO #68
% Solids: 100
Method: SW8260
Date Analyzed: 6/4/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKZ04A	SL	-	-	6/4/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/Kg	1.0	5	5
TOLUENE	<5	ug/Kg	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/Kg	1.0	5	5
ETHYLBENZENE	<5	ug/Kg	1.0	5	5
NAPHTHALENE	<5	ug/Kg	1.0	5	5
MTBE	<5	ug/Kg	1.0	5	5
TOTAL XYLENES	<5	ug/Kg	1.0	5	5
DIBROMOFLUOROMETHANE	122	%	1.0		
1,2-DICHLOROETHANE-D4	124	%	1.0		
TOLUENE-D8	113	%	1.0		
P-BROMOFLUOROBENZENE	109	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: VBLKZ05A
SDG: WP2703
Report Date: 7/2/99
PO No.: N7912-P99264
Project: CTO #68
% Solids: 100
Method: SW8260
Date Analyzed: 6/5/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKZ05A	SL	-	-	6/5/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/Kg	1.0	5	5
TOLUENE	<5	ug/Kg	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/Kg	1.0	5	5
ETHYLBENZENE	<5	ug/Kg	1.0	5	5
NAPHTHALENE	<5	ug/Kg	1.0	5	5
MTBE	<5	ug/Kg	1.0	5	5
TOTAL XYLENES	<5	ug/Kg	1.0	5	5
DIBROMOFLUOROMETHANE	117	%	1.0		
1,2-DICHLOROETHANE-D4	116	%	1.0		
1,2-DICHLOROETHANE-D8	114	%	1.0		
P-BROMOFLUOROBENZENE	107	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKF07A
SDG: WP2703
Report Date: 7/2/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 6/7/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKF07A	AQ	-	-	6/7/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	88	%	1.0		
1,2-DICHLOROETHANE-D4	80	%	1.0		
TOLUENE-D8	85	%	1.0		
P-BROMOFLUOROBENZENE	79	%	1.0		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: F0728

Sample ID: LCSF03A

Date Run: 6/3/99

Analyst: DJP

Time Injected 10:33:00 PM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
I,2-DIBROMOETHANE	50	52.8	106	60-140
BENZENE	50	51.0	102	60-140
ETHYLBENZENE	50	49.8	100	60-140
MTBE	50	49.6	99	60-140
NAPHTHALENE	50	48.7	97	60-140
TOLUENE	50	51.3	103	60-140
TOTAL XYLENES	150	146	97	60-140

*** Out of Limits**

1

1000302

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: F0744

Sample ID: LCSF04A

Date Run: 6/4/99

Analyst: DJP

Time Injected 9:14:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	54.1	108	60-140
BENZENE	50	51.2	102	60-140
ETHYLBENZENE	50	50.6	101	60-140
MTBE	50	50.1	100	60-140
NAPHTHALENE	50	49.3	99	60-140
TOLUENE	50	51.1	102	60-140
TOTAL XYLENES	150	146	98	60-140

*** Out of Limits**

1

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Z0972

Sample ID: LCSZ04A

Date Run: 6/4/99

Analyst: KMC

Time Injected 9:27:00 AM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	58.3	116	60-140
BENZENE	50	54.8	110	60-140
ETHYLBENZENE	50	65.9	132	60-140
MTBE	50	56.5	113	60-140
NAPHTHALENE	50	50.5	101	60-140
TOLUENE	50	59.1	118	60-140
TOTAL XYLENES	150	202	135	60-140

* Out of Limits

1

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Z0988

Sample ID: LCSZ05A

Date Run: 6/5/99

Analyst: JSS

Time Injected 11:30:00 AM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	49.9	100	60-140
BENZENE	50	48.3	97	60-140
ETHYLBENZENE	50	55.2	110	60-140
MTBE	50	52.5	105	60-140
NAPHTHALENE	50	45.8	92	60-140
TOLUENE	50	49.2	98	60-140
TOTAL XYLENES	150	165	110	60-140

*** Out of Limits**

1

1000325

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: F0796

Sample ID: LCSF07A

Date Run: 6/7/99

Analyst: KRT

Time Injected 10:00:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	46.3	92	60-140
BENZENE	50	47.2	94	60-140
ETHYLBENZENE	50	47.9	96	60-140
MTBE	50	45.7	91	60-140
NAPHTHALENE	50	46.8	94	60-140
TOLUENE	50	47.1	94	60-140
TOTAL XYLENES	150	141	94	60-140

*** Out of Limits**

1

1000331



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-1
SDG: WP2703
Report Date: 7/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 93
Method: EPA 8270
Date Analyzed: 7/14/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB040708	SL	6/1/99	6/2/99	6/7/99	PMM	SW3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<360	ug/Kg	1.1	360	330
2-METHYLNAPHTHALENE	<360	ug/Kg	1.1	360	330
ACENAPHTHYLENE	<360	ug/Kg	1.1	360	330
ACENAPHTHENE	<360	ug/Kg	1.1	360	330
FLUORENE	<360	ug/Kg	1.1	360	330
PHENANTHRENE	<360	ug/Kg	1.1	360	330
ANTHRACENE	<360	ug/Kg	1.1	360	330
FLUORANTHENE	<360	ug/Kg	1.1	360	330
PYRENE	<360	ug/Kg	1.1	360	330
BENZO[A]ANTHRACENE	<360	ug/Kg	1.1	360	330
CHRYSENE	<360	ug/Kg	1.1	360	330
BENZO[B]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[K]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[A]PYRENE	<360	ug/Kg	1.1	360	330
INDENO[1,2,3-CD]PYRENE	<360	ug/Kg	1.1	360	330
DIBENZ[A,H]ANTHRACENE	<360	ug/Kg	1.1	360	330
BENZO[G,H,I]PERYLENE	<360	ug/Kg	1.1	360	330
NITROBENZENE-D5	57	%	1.1		
2-FLUOROBIPHENYL	65	%	1.1		
TERPHENYL-D14	90	%	1.1		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2703-2
SDG: WP2703
Report Date: 7/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 93
Method: EPA 8270
Date Analyzed: 7/15/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB05089	SL	6/1/99	6/2/99	6/7/99	PMM	SW3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	7600	ug/Kg	21	6900	330
2-METHYLNAPHTHALENE	45000	ug/Kg	21	6900	330
ACENAPHTHYLENE	<6900	ug/Kg	21	6900	330
ACENAPHTHENE	<6900	ug/Kg	21	6900	330
FLUORENE	8000	ug/Kg	21	6900	330
PHENANTHRENE	11000	ug/Kg	21	6900	330
ANTHRACENE	<6900	ug/Kg	21	6900	330
FLUORANTHENE	<6900	ug/Kg	21	6900	330
PYRENE	<6900	ug/Kg	21	6900	330
BENZO[A]ANTHRACENE	<6900	ug/Kg	21	6900	330
CHRYSENE	<6900	ug/Kg	21	6900	330
BENZO[B]FLUORANTHENE	<6900	ug/Kg	21	6900	330
BENZO[K]FLUORANTHENE	<6900	ug/Kg	21	6900	330
BENZO[A]PYRENE	<6900	ug/Kg	21	6900	330
INDENO[1,2,3-CD]PYRENE	<6900	ug/Kg	21	6900	330
DIBENZ[A,H]ANTHRACENE	<6900	ug/Kg	21	6900	330
BENZO[G,H,I]PERYLENE	<6900	ug/Kg	21	6900	330
NITROBENZENE-D5	DL	%	21		
2-FLUOROBIPHENYL	DL	%	21		
TERPHENYL-D14	DL	%	21		

Report Notes: O-1, DL



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-3
SDG: WP2703
Report Date: 7/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 93
Method: EPA 8270
Date Analyzed: 7/14/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB050809D	SL	6/1/99	6/2/99	6/7/99	PMM	SW3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	2800	ug/Kg	1.1	360	330
2-METHYLNAPHTHALENE	E14000	ug/Kg	1.1	360	330
ACENAPHTHYLENE	<360	ug/Kg	1.1	360	330
ACENAPHTHENE	880	ug/Kg	1.1	360	330
FLUORENE	2300	ug/Kg	1.1	360	330
PHENANTHRENE	4400	ug/Kg	1.1	360	330
ANTHRACENE	<360	ug/Kg	1.1	360	330
FLUORANTHENE	<360	ug/Kg	1.1	360	330
PYRENE	J200	ug/Kg	1.1	360	330
BENZO[A]ANTHRACENE	<360	ug/Kg	1.1	360	330
CHRYSENE	<360	ug/Kg	1.1	360	330
BENZO[B]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[K]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[A]PYRENE	<360	ug/Kg	1.1	360	330
INDENO[1,2,3-CD]PYRENE	<360	ug/Kg	1.1	360	330
DIBENZ[A,H]ANTHRACENE	<360	ug/Kg	1.1	360	330
BENZO[G,H,I]PERYLENE	<360	ug/Kg	1.1	360	330
NITROBENZENE-D5	#153	%	1.1		
2-FLUOROBIPHENYL	57	%	1.1		
TERPHENYL-D14	70	%	1.1		

Report Notes: J, E, #



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-3DL
SDG: WP2703
Report Date: 7/27/99
PO No.: N7912-P99264
Project: CTO #68
% Solids: 93
Method: EPA 8270
Date Analyzed: 7/14/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB050809D	SL	6/1/99	6/2/99	6/7/99	PMM	SW3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	2600	ug/Kg	5.4	1800	330
2-METHYLNAPHTHALENE	17000	ug/Kg	5.4	1800	330
ACENAPHTHYLENE	1940	ug/Kg	5.4	1800	330
ACENAPHTHENE	<1800	ug/Kg	5.4	1800	330
FLUORENE	3700	ug/Kg	5.4	1800	330
PHENANTHRENE	5600	ug/Kg	5.4	1800	330
ANTHRACENE	<1800	ug/Kg	5.4	1800	330
FLUORANTHENE	<1800	ug/Kg	5.4	1800	330
PYRENE	<1800	ug/Kg	5.4	1800	330
BENZO[A]ANTHRACENE	<1800	ug/Kg	5.4	1800	330
CHRYSENE	<1800	ug/Kg	5.4	1800	330
BENZO[B]FLUORANTHENE	<1800	ug/Kg	5.4	1800	330
BENZO[K]FLUORANTHENE	<1800	ug/Kg	5.4	1800	330
BENZO[A]PYRENE	<1800	ug/Kg	5.4	1800	330
INDENO[1,2,3-CD]PYRENE	<1800	ug/Kg	5.4	1800	330
DIBENZO[A,H]ANTHRACENE	<1800	ug/Kg	5.4	1800	330
BENZO[G,H,I]PERYLENE	<1800	ug/Kg	5.4	1800	330
NITROBENZENE-D5	109	%	5.4		
2-FLUOROBIPHENYL	108	%	5.4		
TERPHENYL-D14	79	%	5.4		

Report Notes: J, O-2



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-5
SDG: WP2703
Report Date: 7/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 91
Method: EPA 8270
Date Analyzed: 7/14/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB070708	SL	6/1/99	6/2/99	6/7/99	PMM	SW3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<360	ug/Kg	1.1	360	330
2-METHYLNAPHTHALENE	<360	ug/Kg	1.1	360	330
ACENAPHTHYLENE	<360	ug/Kg	1.1	360	330
ACENAPHTHENE	<360	ug/Kg	1.1	360	330
FLUORENE	<360	ug/Kg	1.1	360	330
PHENANTHRENE	<360	ug/Kg	1.1	360	330
ANTHRACENE	<360	ug/Kg	1.1	360	330
FLUORANTHENE	<360	ug/Kg	1.1	360	330
PYRENE	<360	ug/Kg	1.1	360	330
BENZO[A]ANTHRACENE	<360	ug/Kg	1.1	360	330
CHRYSENE	<360	ug/Kg	1.1	360	330
BENZO[B]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[K]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[A]PYRENE	<360	ug/Kg	1.1	360	330
INDENO[1,2,3-CD]PYRENE	<360	ug/Kg	1.1	360	330
DIBENZ[A,H]ANTHRACENE	<360	ug/Kg	1.1	360	330
BENZO[G,H,I]PERYLENE	<360	ug/Kg	1.1	360	330
NITROBENZENE-D5	54	%	1.1		
2-FLUOROBIPHENYL	67	%	1.1		
TERPHENYL-D14	86	%	1.1		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2703-6
SDG: WP2703
Report Date: 7/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 94
Method: EPA 8270
Date Analyzed: 7/14/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB110708	SL	6/1/99	6/2/99	6/7/99	PMM	SW3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<330	ug/Kg	1.0	330	330
2-METHYLNAPHTHALENE	<330	ug/Kg	1.0	330	330
ACENAPHTHYLENE	<330	ug/Kg	1.0	330	330
ACENAPHTHENE	<330	ug/Kg	1.0	330	330
FLUORENE	<330	ug/Kg	1.0	330	330
PHENANTHRENE	<330	ug/Kg	1.0	330	330
ANTHRACENE	<330	ug/Kg	1.0	330	330
FLUORANTHENE	<330	ug/Kg	1.0	330	330
PYRENE	<330	ug/Kg	1.0	330	330
BENZO[A]ANTHRACENE	<330	ug/Kg	1.0	330	330
CHRYSENE	<330	ug/Kg	1.0	330	330
BENZO[B]FLUORANTHENE	<330	ug/Kg	1.0	330	330
BENZO[K]FLUORANTHENE	<330	ug/Kg	1.0	330	330
BENZO[A]PYRENE	<330	ug/Kg	1.0	330	330
INDENO[1,2,3-CD]PYRENE	<330	ug/Kg	1.0	330	330
DIBENZ[A,H]ANTHRACENE	<330	ug/Kg	1.0	330	330
BENZO[G,H,I]PERYLENE	<330	ug/Kg	1.0	330	330
NITROBENZENE-D5	30	%	1.0		
2-FLUOROBIPHENYL	55	%	1.0		
TERPHENYL-D14	103	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2703-7
SDG: WP2703
Report Date: 7/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 92
Method: EPA 8270
Date Analyzed: 7/14/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB120708	SL	6/1/99	6/2/99	6/7/99	PMM	SW3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<360	ug/Kg	1.1	360	330
2-METHYLNAPHTHALENE	<360	ug/Kg	1.1	360	330
ACENAPHTHYLENE	<360	ug/Kg	1.1	360	330
ACENAPHTHENE	<360	ug/Kg	1.1	360	330
FLUORENE	<360	ug/Kg	1.1	360	330
PHENANTHRENE	<360	ug/Kg	1.1	360	330
ANTHRACENE	<360	ug/Kg	1.1	360	330
FLUORANTHENE	<360	ug/Kg	1.1	360	330
PYRENE	<360	ug/Kg	1.1	360	330
BENZO[A]ANTHRACENE	<360	ug/Kg	1.1	360	330
CHRYSENE	<360	ug/Kg	1.1	360	330
BENZO[B]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[K]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[A]PYRENE	<360	ug/Kg	1.1	360	330
INDENO[1,2,3-CD]PYRENE	<360	ug/Kg	1.1	360	330
DIBENZ[A,H]ANTHRACENE	<360	ug/Kg	1.1	360	330
BENZO[G,H,I]PERYLENE	<360	ug/Kg	1.1	360	330
NITROBENZENE-D5	36	%	1.1		
2-FLUOROBIPHENYL	56	%	1.1		
TERPHENYL-D14	88	%	1.1		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2703-8
SDG: WP2703
Report Date: 7/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 7/12/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29E00301	AQ	6/1/99	6/2/99	6/5/99	PMM	SW3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
ENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	68	%	1.0		
2-FLUOROBIPHENYL	69	%	1.0		
TERPHENYL-D14	78	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2703-9
SDG: WP2703
Report Date: 7/27/99
PO No.: N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 7/12/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29F00301	AQ	6/1/99	6/2/99	6/5/99	PMM	SW3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	48	%	1.0		
2-FLUOROBIPHENYL	53	%	1.0		
TERPHENYL-D14	65	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2703-10
SDG: WP2703
Report Date: 7/27/99
PO No.: N7912-P99264
Project: CTO #68
% Solids: 93
Method: EPA 8270
Date Analyzed: 7/16/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29SLB060809	SL	6/1/99	6/2/99	6/7/99	PMM	SW3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<360	ug/Kg	1.1	360	330
2-METHYLNAPHTHALENE	<360	ug/Kg	1.1	360	330
ACENAPHTHYLENE	<360	ug/Kg	1.1	360	330
ACENAPHTHENE	<360	ug/Kg	1.1	360	330
FLUORENE	<360	ug/Kg	1.1	360	330
PHENANTHRENE	<360	ug/Kg	1.1	360	330
ANTHRACENE	<360	ug/Kg	1.1	360	330
FLUORANTHENE	<360	ug/Kg	1.1	360	330
PYRENE	<360	ug/Kg	1.1	360	330
ENZO[A]ANTHRACENE	<360	ug/Kg	1.1	360	330
CHRYSENE	<360	ug/Kg	1.1	360	330
BENZO[B]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[K]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[A]PYRENE	<360	ug/Kg	1.1	360	330
INDENO[1,2,3-CD]PYRENE	<360	ug/Kg	1.1	360	330
DIBENZ[A,H]ANTHRACENE	<360	ug/Kg	1.1	360	330
BENZO[G,H,I]PERYLENE	<360	ug/Kg	1.1	360	330
NITROBENZENE-D5	55	%	1.1		
2-FLUOROBIPHENYL	72	%	1.1		
TERPHENYL-D14	80	%	1.1		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

Summary of Report Notes

Report Note	Note Text
#	'#' flag denotes surrogate compound recovery is out of criteria.
DL	'DL' flag denotes inability to calculate surrogate recovery due to sample dilution.
E	'E' flag indicates an estimated value. The analyte was detected in the sample at a concentration greater than the standard calibration range.
J	'J' flag denotes an estimated value less than the Laboratory's Practical Quantitation Level.
O-1	Sample dilution required due to matrix interference, sample viscosity or other matrix-related problem; therefore, standard laboratory Practical Quantitation Level (PQL) could not be achieved.
O-2	Sample dilution required for quantitation of one or more target analytes; therefore, standard laboratory Practical Quantitation Level (PQL) could not be achieved.

ATER SEMIVOLATILE SYSTEM MONITORING COMPOUND RECOVER

Lab Name: Katahdin Analytical Services

SDG No.: WP2703

Matrix: WATER

Client Sample ID	Lab Sample ID	SMC1 (NBZ) #	SMC2 (FBP) #	SMC3 (TPH) #	Total Out
SBLK;060599	SBLK;060599	81	84	79	0
29E00301	WP2703-8	68	69	78	0
29F00301	WP2703-9	48	53	65	0
LCS;060599	LCS;060599	91	76	66	0

QC LIMITS

SMC1 (NBZ) = NITROBENZENE-D5 (36-117)
SMC2 (FBP) = 2-FLUOROBIPHENYL (47-114)
SMC3 (TPH) = TERPHENYL-D14 (35-126)

Column to be used to flag recovery value

* Values are outside of QC limits

2A
SOIL SEMIVOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: Katahdin Analytical Services

SDG No.: WP2703

Matrix: SOIL

Client Sample ID	Lab Sample ID	SMC1 (NBZ) #	SMC2 (FBP) #	SMC3 (TPH) #	Total Out
SBLK;060799	SBLK;060799	69	75	82	0
LCS;060799	LCS;060799	73	75	82	0
29SLB040708	WP2703-1	57	65	90	0
29SLB050809D	WP2703-3	153 *	57	70	1
29SLB070708	WP2703-5	54	67	86	0
29SLB110708	WP2703-6	30	55	103	0
29SLB120708	WP2703-7	36	56	88	0
29SLB050809DDL	WP2703-3DL	110 *	108	79	1
29SLB05089	WP2703-2	DL	DL	DL	0
29SLB060809	WP2703-10	55	72	80	0
29SLB060809MS	WP2703-10MS	59	66	70	0
29SLB060809MSD	WP2703-10MSD	60	63	67	0

QC LIMITS

SMC1 (NBZ) = NITROBENZENE-D5 (14-107)
 SMC2 (FBP) = 2-FLUOROBIPHENYL (32-109)
 SMC3 (TPH) = TERPHENYL-D14 (26-116)

Column to be used to flag recovery value

* Values are outside of QC limits



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: SBLK060599
SDG: WP2703
Report Date: 7/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 7/12/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
SBLK060599	AQ	-	-	6/5/99	PMM	SW3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	81	%	1.0		
2-FLUOROBIPHENYL	84	%	1.0		
TERPHENYL-D14	79	%	1.0		

Report Notes:

Katahdin Analytical Services

8270 LCS Recovery Sheet

Lab File: X2187

Sample ID: LCS;060599

Date Run: 7/13/99

Analyst: KRT

Time Injected 12:33:00 PM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
2-METHYLNAPHTHALENE	50	33.9	*68	70-130
ACENAPHTHENE	50	41.0	82	70-130
ACENAPHTHYLENE	50	38.3	77	70-130
ANTHRACENE	50	40.0	80	70-130
BENZO[A]ANTHRACENE	50	42.6	85	70-130
BENZO[A]PYRENE	50	45.4	91	70-130
BENZO[B]FLUORANTHENE	50	44.2	88	70-130
BENZO[G,H,I]PERYLENE	50	50.2	100	70-130
BENZO[K]FLUORANTHENE	50	44.3	88	70-130
CHRYSENE	50	41.9	84	70-130
DIBENZ[A,H]ANTHRACENE	50	50.2	100	70-130
FLUORANTHENE	50	44.3	89	70-130
FLUORENE	50	39.3	78	70-130
INDENO[1,2,3-CD]PYRENE	50	57.7	115	70-130
NAPHTHALENE	50	47.9	96	70-130
PHENANTHRENE	50	41.1	82	70-130
PYRENE	50	40.8	82	70-130

* Out of Limits

1

Katahdin Analytical Services

8270 LCS Recovery Sheet

Lab File: Z1342

Sample ID: LCS;060799

Date Run: 7/12/99

Analyst: KRT

Time Injected 8:41:00 PM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
2-METHYLNAPHTHALENE	1667	1300	78	60-140
ACENAPHTHENE	1667	1310	79	60-140
ACENAPHTHYLENE	1667	1250	75	60-140
ANTHRACENE	1667	1270	76	60-140
BENZO[A]ANTHRACENE	1667	1210	73	60-140
BENZO[A]PYRENE	1667	1260	76	60-140
BENZO[B]FLUORANTHENE	1667	1210	72	60-140
BENZO[G,H,I]PERYLENE	1667	1540	92	60-140
BENZO[K]FLUORANTHENE	1667	1380	83	60-140
CHRYSENE	1667	1280	77	60-140
DIBENZ[A,H]ANTHRACENE	1667	1450	87	60-140
FLUORANTHENE	1667	1380	83	60-140
FLUORENE	1667	1380	82	60-140
INDENO[1,2,3-CD]PYRENE	1667	1720	103	60-140
NAPHTHALENE	1667	1250	75	60-140
PHENANTHRENE	1667	1360	82	60-140
PYRENE	1667	1210	72	60-140

* Out of Limits

1

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
WP2703-10	Z1396	7/16/99	10:27:00 AM	KRT	SL	8270_99
WP2703-10MS	Z1397	7/16/99	11:13:00 AM	KRT	SL	8270_99
WP2703-10MSD	Z1398	7/16/99	12:00:00 PM	KRT	SL	8270_99

Compound Name	Native (ug/Kg)	MS Spk Amount (ug/Kg)	MSD Spk Amount (ug/Kg)	MS Result (ug/Kg)	MSD Result (ug/Kg)	MS REC (%)	MSD REC (%)	Recovery Limits (%)	RPD (%)	RPD Limit (%)
CHRYSENE	0	1790	1790	1000	958	*56	*54	60-140	4.3	50
ACENAPHTHENE	0	1790	1790	1170	1130	65	63	60-140	3.5	50
ACENAPHTHYLENE	0	1790	1790	1080	1020	60	*57	60-140	5.7	50
ANTHRACENE	0	1790	1790	1080	1030	60	*58	60-140	4.7	50
BENZO[A]ANTHRACENE	0	1790	1790	1080	1060	60	*59	60-140	1.9	50
BENZO[A]PYRENE	0	1790	1790	1080	1030	60	*58	60-140	4.7	50
BENZO[B]FLUORANTHENE	0	1790	1790	1140	1120	64	62	60-140	1.8	50
2-METHYLNAPHTHALENE	0	1790	1790	1170	1180	65	66	60-140	0.85	50
BENZO[K]FLUORANTHENE	0	1790	1790	1090	1100	61	61	60-140	0.91	50
PYRENE	0	1790	1790	1120	1070	63	60	60-140	4.6	50
DIBENZ[A,H]ANTHRACENE	0	1790	1790	1050	964	*59	*54	60-140	8.5	50
FLUORANTHENE	0	1790	1790	1040	1010	*58	*57	60-140	2.9	50
FLUORENE	0	1790	1790	1190	1150	67	64	60-140	3.4	50
INDENO[1,2,3-CD]PYRENE	0	1790	1790	1090	857	61	*48	60-140	24	50
NAPHTHALENE	0	1790	1790	1100	1110	62	62	60-140	0.90	50
PHENANTHRENE	0	1790	1790	1270	1220	71	68	60-140	4.0	50
BENZO[G,H,I]PERYLENE	0	1790	1790	1080	962	60	*54	60-140	12	50

$$RPD = [(ms\ res - msd\ res) / (ms\ res + msd\ res) / 2] * 100$$

* Out of Limits

1

2000382

CLIENT: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-2703-1
Report Date: 07/28/99
PO No. : N7912-P99264
Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 1 of 7

SAMPLE DESCRIPTION	MATRIX			SAMPLED BY		SAMPLED DATE RECEIVED		
29SLB040708	Solid			J. HILL		06/01/99	06/02/99	
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES	
Solids-Total Residue (TS)	92.	wt %	1.0	0.10	CLP/CIP SOW	06/04/99 JF	1	

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.
(1) Sample Preparation on 06/03/99 by JF

07/28/99

LJO/baeajc(dw)/msm
PF03TSS6

CC: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.



CLIENT: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-2703-2
Report Date: 07/28/99
PO No. : N7912-P99264
Project : CTO #68

WICH#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 2 of 7

SAMPLE DESCRIPTION	MATRIX			SAMPLED BY		SAMPLED DATE RECEIVED	
29SLB05089	Solid			J. HILL		06/01/99	06/02/99
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES
Solids-Total Residue (TS)	93.	wt %	1.0	0.10	CLP/CIP SOW	06/04/99 JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.
(1) Sample Preparation on 06/03/99 by JF

07/28/99

LJO/baeajc(dw)/msm
PF03TSS6
CC: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.



CLIENT: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-2703-3
Report Date: 07/28/99
PO No. : N7912-P99264
Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 3 of 7

SAMPLE DESCRIPTION		MATRIX		SAMPLED BY		SAMPLED DATE RECEIVED		
29SLB050809D		Solid		J. HILL		06/01/99	06/02/99	
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	93.	wt %	1.0	0.10	CLP/CIP SOW	06/04/99	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.
(1) Sample Preparation on 06/03/99 by JF

07/28/99

LJO/baeajc(dw)/msm
PF03TSS6
CC: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.

CLIENT: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-2703-5
Report Date: 07/28/99
PO No. : N7912-P99264
Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 4 of 7

SAMPLE DESCRIPTION	MATRIX			SAMPLED BY		SAMPLED DATE RECEIVED	
29SLB070708	Solid			J. HILL		06/01/99	06/02/99
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES
Solids-Total Residue (TS)	91.	wt %	1.0	0.10	CLP/CIP SCW	06/04/99 JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.
(1) Sample Preparation on 06/03/99 by JF

07/28/99

LJO/baeajc(dw)/msm
PF03TSS6
CC: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.



CLIENT: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-2703-6
Report Date: 07/28/99
PO No. : N7912-P99264
Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 5 of 7

SAMPLE DESCRIPTION	MATRIX			SAMPLED BY		SAMPLED DATE RECEIVED	
29SLB110708	Solid			J. HILL		06/01/99	06/02/99
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES
Solids-Total Residue (TS)	94.	wt %	1.0	0.10	CLP/CIP SOW	06/04/99 JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.
(1) Sample Preparation on 06/03/99 by JF

07/28/99

LJO/baeajc (dw) /msm
PF03TSS6
CC: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.



CLIENT: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-2703-7
Report Date: 07/28/99
PO No. : N7912-P99264
Project : CTO #68

WICH#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 6 of 7

SAMPLE DESCRIPTION	MATRIX			SAMPLED BY		SAMPLED DATE RECEIVED		
29SLB120708	Solid			J. HILL		06/01/99	06/02/99	
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	93.	wt %	1.0	0.10	CLP/CIP SOW	06/04/99	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 06/03/99 by JF

07/28/99

LJO/baeajc(dw)/msm
PF03TSS6
CC: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7

661 ANDERSEN DR.
P.O. Box 720, Westbrook, ME 04098
Tel: (207) 874-2400 Fax: (207) 775-4029

<http://katahdinlab.com>

210 West Road No. 5, Portsmouth, NH 03801
Tel: (603) 431-5777 Fax: (603) 436-3356

0000030

CLIENT: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr., Suite 102
 Tallahassee, FL 32308

Lab Number : WP-2703-10
 Report Date: 07/28/99
 PO No. : N7912-P99264
 Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 7 of 7

SAMPLE DESCRIPTION	MATRIX			SAMPLED BY		SAMPLED DATE RECEIVED		
29SLB060809	Solid			J. HILL		06/01/99	06/02/99	
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	93.	wt %	1.0	0.10	CLP/CIP SOW	06/07/99	JF	1
Total Combustible Organics	2.7	wt %	1.0	0.1	ASTM D2974-8	06/07/99	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.
 (1) Sample Preparation on 06/04/99 by JF

07/28/99

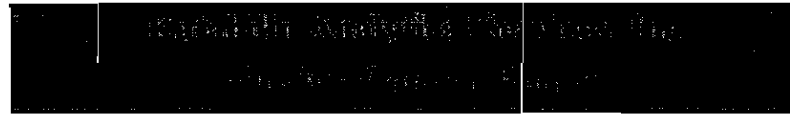
LJO/baeajc(dw)/msm
 PF04TSS1
 CC: MS. LEE LECK
 TETRA TECH NUS
 FOSTER PLAZA 7

340 CAMP ROAD
 WESTBROOK, NH 04098
 TEL: (207) 874-2400 FAX: (207) 775-4029

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 Tel: (603) 431-5777 Fax: (603) 436-3356

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Method Blank and Laboratory Control Sample Results

Client:	Tetra Tech NUS
Work Order:	WP2703

METHOD BLANK RESULTS									LABORATORY CONTROL SAMPLE RESULTS				
Parameter	Date of Prep	Date of Analysis	Units	Concentration Measured in Blank		Acceptance Range	Practical Quantitation Level**	Units	True Value	Measured Value	Percent Recovered	Acceptance Range (%)	Acceptance Range (mg/kg)
TS -Total Residue	03-Jun-99	04-Jun-99	wt %	<	0.10	< 0.10	0.10	wt %	90	89.9	99.9	80-120	
	04-Jun-99	07-Jun-99	wt %	<	0.10	< 0.10	0.10	wt %			NA	80-120	
TCO	04-Jun-99	07-Jun-99	wt %	<	0.10	< 0.10	0.10	wt %			NA	80-120	

** Practical quantitation level is the lowest concentration measurable for samples with normal chemical and physical composition during routine laboratory operations.

DATA QUALITY COMMENTS:

Results of all quality control measurements are within the laboratory and method specified acceptance range except as noted.



Duplicate and Matrix Spike/Matrix Spike Duplicate Results

Client:	Tetra Tech NUS
Work Order:	WP2703

*DUPLICATE RESULTS**MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS*

Parameter	Sample No	Sample Measurements			Mean Conc	RPD (%)	Acceptance Range for RPD (%)	Concentration or Quantity				Matrix Spike Recovery (%)				RPD (%)	Acceptance Range (%)
		Units	Rep 1	Rep 2				Units Sampl Only	Spike Added	Sample +Spike Dup 1	Sample +Spike Dup 2	Sample +Spike Dup 1	Sample +Spike Dup 2	Acceptance Range (%)			
TS	WP2703-1	wt%	92.2	92.8	92.5	0.6	0-20	MS/MSD Not Applicable for this Parameter									
	WP2703-10	wt%	92.7	92.9	92.8	0.2	0-20	MS/MSD Not Applicable for this Parameter									
TCO	WP2703-10	wt%	2.66	2.68	2.67	0.7	0-20	MS/MSD Not Applicable for this Parameter									

RPD = Relative percent difference, which is the absolute value of the difference between two replicate results divided by the mean concentration then multiplied by 100%.

DATA QUALITY COMMENTS:

Results of all quality control measurements are within the laboratory or contract specified acceptance range except as noted. The laboratory does not use the sample duplicate and matrix spike acceptance ranges as acceptance criteria for a specific analysis. Sample duplicate and matrix spike data are used to evaluate method performance in the environmental sample matrix only. Please refer to LCS data for assessment of quality control for each parameter.

Client: Katahdin Analytical
340 County Road
Westbrook, Maine 04092
Contact: Ms. Andrea Colby
Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 29SLB060809
Lab ID : 9906058-01
Matrix : Soil
Date Collected : 06/01/99
Date Received : 06/01/99
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Evaporative Loss @ 105 C		8.00	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	1
Total Organic Carbon		6780	43.1	100	mg/kg	1.0	LS	06/18/99	1725	150724	2

M = Method

Method-Description

M 1 EPA 3550
M 2 SW846 9060 Modified

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

Data reported in mass/mass units is reported as 'dry weight'.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (843) 769-7391.

Reviewed By



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Client: Katahdin Analytical
340 County Road
Westbrook, Maine 04092
Contact: Ms. Andrea Colby
Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 14SLB020203
Lab ID : 9906097-01
Matrix : Soil
Date Collected : 06/02/99
Date Received : 06/02/99
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		785	66.0	132	mg/kg	1.0	AAT	06/22/99	0950	151686	1
Evaporative Loss @ 105 C		24.0	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	2

M = Method	Method-Description
M 1	SW846 9071A
M 2	EPA 3550

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

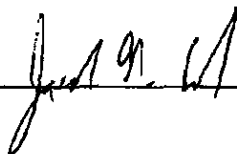
U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

Data reported in mass/mass units is reported as 'dry weight'.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (843) 769-7391.

Reviewed By



Client: Katahdin Analytical
340 County Road
Westbrook, Maine 04092
Contact: Ms. Andrea Colby
Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 14SLB020203D
Lab ID : 9906097-02
Matrix : Soil
Date Collected : 06/02/99
Date Received : 06/02/99
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		321	59.5	119	mg/kg	1.0	AAT	06/22/99	0950	151686	1
Evaporative Loss @ 105 C		16.0	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	2

M = Method	Method-Description
M 1	SW846 9071A
M 2	EPA 3550

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

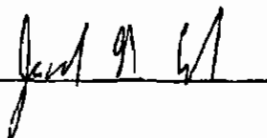
U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

Data reported in mass/mass units is reported as 'dry weight'.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (843) 769-7391.

Reviewed By



4006097 002

Client: Katahdin Analytical
340 County Road
Westbrook, Maine 04092
Contact: Ms. Andrea Colby
Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 14SLB050304
Lab ID : 9906097-03
Matrix : Soil
Date Collected : 06/02/99
Date Received : 06/02/99
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Evaporative Loss @ 105 C		13.0	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	1
Total Organic Carbon		11900	43.1	100	mg/kg	1.0	LS	06/18/99	1836	150724	2

M = Method	Method-Description
M 1	EPA 3550
M 2	SW846 9060 Modified

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

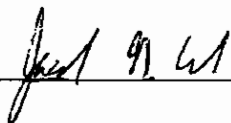
U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

Data reported in mass/mass units is reported as 'dry weight'.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (843) 769-7391.

Reviewed By



9906097-03

Client: Katahdin Analytical
340 County Road
Westbrook, Maine 04092
Contact: Ms. Andrea Colby
Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 15SLB010405
Lab ID : 9906097-04
Matrix : Soil
Date Collected : 06/02/99
Date Received : 06/02/99
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Evaporative Loss @ 105 C		6.00	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	1
Total Organic Carbon		8440	43.1	100	mg/kg	1.0	LS	06/18/99	1909	150724	2

M = Method	Method-Description
M 1	EPA 3550
M 2	SW846 9060 Modified

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

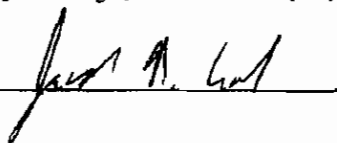
U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

Data reported in mass/mass units is reported as 'dry weight'.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (843) 769-7391.

Reviewed By



Client: Katahdin Analytical
340 County Road
Westbrook, Maine 04092
Contact: Ms. Andrea Colby
Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 15SLB020405
Lab ID : 9906097-05
Matrix : Soil
Date Collected : 06/02/99
Date Received : 06/02/99
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		261	55.5	111	mg/kg	1.0	AAT	06/22/99	0930	151686	1
Evaporative Loss @ 105 C		10.0	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	2

M = Method	Method-Description
M 1	SW846 9071A
M 2	EPA 3550

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

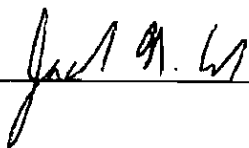
U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

Data reported in mass/mass units is reported as 'dry weight'.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (843) 769-7391.

Reviewed By



Client: Katahdin Analytical
340 County Road
Westbrook, Maine 04092
Contact: Ms. Andrea Colby
Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 15SLB020405D
Lab ID : 9906097-06
Matrix : Soil
Date Collected : 06/02/99
Date Received : 06/02/99
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		231	55.0	110	mg/kg	1.0	AAT	06/22/99	0950	151686	1
Evaporative Loss @ 105 C		9.00	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	2

M = Method	Method-Description
M 1	SW846 9071A
M 2	EPA 3550

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

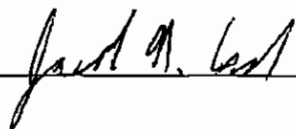
U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

Data reported in mass/mass units is reported as 'dry weight'.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (843) 769-7391.

Reviewed By



Client: Katahdin Analytical
340 County Road
Westbrook, Maine 04092
Contact: Ms. Andrea Colby
Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 29SLB050809
Lab ID : 9906097-07
Matrix : Soil
Date Collected : 06/02/99
Date Received : 06/02/99
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		9150	54.0	108	mg/kg	1.0	AAT	06/22/99	0950	151686	1
Evaporative Loss @ 105 C		7.00	1.00	1.00	wt%	1.0	CJ	06/03/99	1500	150650	2

M = Method	Method-Description
M 1	SW846 9071A
M 2	EPA 3550

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

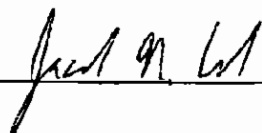
U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

Data reported in mass/mass units is reported as 'dry weight'.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (843) 769-7391.

Reviewed By



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QC Summary Report

Project Description: Former Naval Complex

cc: KATA00199

Lab. Sample ID: 9906097%

Report Date: June 22, 1999

Page 1 of 1

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
General Chemistry													
QC621595	BLANK	151686											
Total Rec. Petro. Hydrocarbons						0.00	mg/kg				AAT	06/22/99	0950
QC621598	9906097-01DUP	151686											
Total Rec. Petro. Hydrocarbons				783		1020	mg/kg	26.3					
QC621600	9906242-01DUP	151686											
Total Rec. Petro. Hydrocarbons				1560		1910	mg/kg	20.0					
QC621596	LCS	151686											
Total Rec. Petro. Hydrocarbons			11000			9840	mg/kg		89.6	(70.0 - 116.)			
QC621597	9906097-01MS	151686											
Total Rec. Petro. Hydrocarbons			13200	783		12600	mg/kg		90.0	(70.0 - 130.)			
QC621599	9906242-01MS	151686											
Total Rec. Petro. Hydrocarbons			12100	1560		13000	mg/kg		94.6	(70.0 - 130.)			
QC617634	BLANK	150650											
Evaporative Loss @ 105 C						0.00	wt%				GJ	06/03/99	1500
QC617632	9906058-01DUP	150650											
Evaporative Loss @ 105 C				8.00		8.00	wt%	0.00					
QC617934	BLANK	150724											
Total Organic Carbon						-2.83	mg/kg				LS	06/18/99	1628
QC617935	9906058-01DUP	150724											
Total Organic Carbon				6780		6830	mg/kg	0.764			LS	06/18/99	1740
QC617937	LCS	150724											
Total Organic Carbon			3750			4420	mg/kg		118	(88.0 - 130.)	LS	06/18/99	1612
QC617936	9906058-01PS	150724											
Total Organic Carbon			10000	6780		16200	mg/kg		94.2	(73.0 - 129.)	LS	06/18/99	1747

Notes:

The qualifiers in this report are defined as follows:

J indicates presence of analyte < RL (Report Limit)

U indicates presence of analyte < DL (Detect Limit)

n/a indicates that spike recovery limits do not apply when
sample concentration exceeds spike conc by a factor of 4 or more

S. W. COLE ENGINEERING, INC.

R E P O R T O F G R A D A T I O N
ASTM C-117, C-136

Project No. 99008
Date 06/07/1999

Project MISCELLANEOUS
Client KATAHDIN ANALYTICAL
Sample No. 21, SAND, WP2703-10

<u>Sieve Size</u>	<u>Percent Passing</u>	<u>PROJECT</u> <u>Specifications %</u>
1/2 "	100.0	
1/4 "	99.6	
# 4	99.6	
# 10	99.4	
# 20	99.1	
# 40	98.8	
# 60	96.1	
# 100	49.0	
# 200	2.2	



**SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
TETRA TECH NUS
CASE CNC CHARLESTON**

Sample Receipt

The following samples were received on June 3, 1999 and were logged in under Katahdin Analytical Services work order number WP2729 for a hardcopy due date of July 3, 1999.

<u>KATAHDIN</u> <u>Sample No.</u>	<u>TTNUS</u> <u>Sample Identification</u>	<u>GEL</u> <u>Sample No.</u>
WP2729-1	14SLB020203	9906097-01
WP2729-2	14SLB020203D	9906097-02
WP2729-3	14SLB060405	
WP2729-4	15SLB020405D	9906097-06
WP2729-5	15SLB040405	
WP2729-6	14SLB040304	
WP2729-7	15SLB020405	9906097-05
WP2729-8	14SLB050304	9906097-03
WP2729-9	15SLB010405	9906097-04
WP2729-10	14TL00401	
WP2729-11	29SLB050809	9906097-07

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

Sample analyses have been performed by the methods as noted herein.

Volatile Organic Analysis

One aqueous and nine soil samples were received by the Katahdin Analytical Services, Inc. GC/MS laboratory on June 3, 1999 and were specified to be analyzed by USEPA method 8260B for the analytes benzene, toluene, ethylbenzene, xylenes, MTBE, naphthalene, and EDB.

Analyses for this workorder were performed on the 5972-F and 5972-Z instruments. A VSTD050 (50 ppb standard) was used for the continuing calibration standard. Internal standard and surrogate compounds were also spiked at 50 ug/l.

Batch QC (VBLK, and LCS) was performed in each twelve-hour window. Results are included in this data package. The LCS QC samples were spiked with the entire list of compounds quantitated for at 50 ppb. No matrix spike/matrix spike duplicate was performed on any sample in this workorder.

0000007

Method 8000B, section 7.5.1.2.1 (Revision 2, 12/96) states, "in those instances where the RSD for one or more analytes exceeds 20%, the initial calibration curve may still be acceptable if the mean of the RSD values for all analytes in the calibration is less than or equal to 20%." Method 8260B narrows this 20% maximum to 15%.

Two initial calibration curves are reported in this workorder. Both calibrations had several analytes exceeding the maximum allowable 15% RSD. The average %RSD for the 5972-F was 13.4%, and the 5972-Z had an average %RSD of 14.8%.

Sample WP2729-1, 2, 3, 5, 6, 7,8, and 9 required reanalysis due to surrogate or internal standard recovery deviations in the initial analysis to confirm matrix interference, both analyses are included.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" (software-generated) on the pertinent quantitation reports. All "M" flags have been dated and initialed by the analyst performing the integration. In addition, all "M" flags have been reviewed and approved by the GC/MS supervisor. Copies of each manual integration are included in the pertinent quantitation reports.

No other protocol deviations were noted by the volatile organics staff.

Semivolatile Organics Extraction and Analysis

Nine soil/sediment samples were received by Katahdin Analytical Services laboratory on June 3, 1999 for analysis in accordance with 8270C for the PAH list of analytes.

Extraction of the samples occurred following USEPA method 3540 on June 8, 1999. A laboratory control spike consisting of all PAH analytes spiked into organic free sand, was extracted in the batch.

The initial calibration curves analyzed in this SDG had some of the target analyte %RSD values exceeding 15 %.

Method 8000B, section 7.5.1.2.1 (Revision 2, 12/96) states, "in those instances where the RSD for one or more analytes exceeds 20%, the initial calibration curve may still be acceptable if the mean of the RSD values for all analytes in the calibration is less than or equal to 20%." Section 7.3.7.1 of method 8270C (revision 3, 12/96) narrows this 20% maximum to 15%.

In the calibration curves analyzed in this SDG, the average %RSD for all analytes was 9.4% and 11.5%, making the curves acceptable.

Initial analysis of sample WP2729-2 yielded internal standard area recovery deviations and target analyte concentrations over the upper limit of the calibration curve. Reanalysis occurred at a 1:5 dilution successfully. Both sets of data are included in this data package.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" by the data system. All manual integrations have been dated and initialed by the responsible

0000003

analyst. Copies of each manual integration are included in the data package. All manual integrations have been reviewed and approved by the GC/MS supervisor.

No other protocol deviations were noted by the semivolatiles organics staff.

Wet Chemistry Analysis

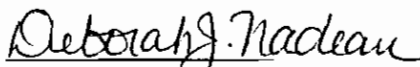
For work order WP2729 the analyses for Total Combustible Organics (TCO) have been performed in accordance with the "Annual Book of ASTM Standards", 1987. Analyses for Solids-Total Residue (TS) for work order WP2729 samples have been performed in accordance with "Contract Laboratory Program Statement of Work for Inorganic Analysis".

All analyses were performed within analytical hold time. No protocol deviations were noted by the Wet Chemistry laboratory staff.

Subcontracted Analysis

Analyses for Total Organic Carbon, Total Petroleum Hydrocarbons and Grain size were subcontracted to outside laboratories. All sets of data are included as separate sections to the data package.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager and/or his designee, as verified by the following signature.


Authorized Signature
7-29-99

KATAHI ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
Tel. (207) 874-2400
Fax (207) 775-4029

LAB (WORK ORDER) # WP 2729

PAGE: 1 OF 1

COOLER: 1 OF 1

COC# —

SDG# —

DATE / TIME RECEIVED: 6-3-99 0945

DELIVERED BY: FedEx

RECEIVED BY: Sam

LIMS ENTRY BY: Sam

LIMS REVIEW BY / PM: ACC

CLIENT: Tetra Tech

PROJECT: Charleston

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>3.9</u>	
6. SAMPLES RECEIVED AT 4°C +/- 2? ICE / ICE PACKS PRESENT <u>Y</u> or N?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u> (RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative added.

000005



340 County Road No. 5
P.O. Box 720
Westbrook, ME 04098
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE PRINT IN PEN

Page ____ of ____

Client Tetra Tech NUS Contact Bryn Hauze Phone # (848) 814 9080 Fax # ()
Address NH21 Ave H City N. Charleston State SC Zip Code 29405
Purchase Order # _____ Proj. Name / No. _____ Katahdin Quote # _____

Bill (if different than above)

Address

Sampler (Print / Sign) Roger Franklin / Mr. Taha

Copies To: _____

LAB USE ONLY

WORK ORDER #:

KATAHDIN PROJECT MANAGER

ANALYSIS AND CONTAINER TYPE
PRESERVATIVES

REMARKS:

SHIPPING INFO:

☐ FED EX

☐ UPS

☐ CLIENT

AIRBILL NO:

809609650243

TEMP °C

☐ TEMP BLANK

☐ INTACT

☐ NOT INTACT

* Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON
14SLB020203	6/24/1450		5	1	4									2
14SLB040304	6/24/1505		5	1	4	1								0
D 14SLB020203D	6/24/1450		5	1	4									2
14SLB050304	11/1525		5	1	4			1						2
14SLB060405	11/1540		5	1	4									
15SLB010405	11/1220		5	1	4			1					PID? >200	
15SLB020405	11/1230		5	1	4	1							PID? >200	
D 15SLB020405D	11/1230		5	1	4								PID? >200	
15SLB040405	11/1245		5	1	4								PID? >200	
14TL00401	11/1		2		2									
/	/													
/	/													
/	/													
/	/													
/	/													
/	/													
/	/													
/	/													

COMMENTS

QC-IV - NFESC Results De: 6-16-99 (BR)

Relinquished By: (Signature)

Date / Time

Received By: (Signature)

Relinquished By: (Signature)

Date / Time

Received By: (Signature)

Relinquished By: (Signature)

Date / Time

Received By: (Signature)

Relinquished By: (Signature)

Date / Time

Received By: (Signature)

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 1

ORDER NO WP-2729

Project Manager: Andrea J. Colby

RT TO: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 06/03/99

PHONE: 850/385-9899

FAX: 850/385-9860

DUE: 03 JUL

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
661 ANDERSEN DRIVE, FOSTER PLAZA VII
PITTSBURGH, PA 15220-2745

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: R. FRANKLIN

DELIVERED BY: FEDEX

DISPOSE: AFTER 02 AUG

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WP2729-3	14SLB060405	02 JUN 1540	03 JUN	SL
	WP2729-5	15SLB040405	02 JUN 1245		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	2	135.00	270.00
Volatile Organics by 8260B	SW8260	2	85.00	170.00
Solids-Total Residue (TS)	CLP/CIP SO	2	0.00	0.00
TOTALS		2	220.00	440.00

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
WP2729-6	14SLB040304	02 JUN 1505	03 JUN	SL

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	135.00	135.00
Volatile Organics by 8260B	SW8260	1	85.00	85.00
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Wet Lab Subcontract		1	110.00	110.00
TOTALS		1	330.00	330.00

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
3 WP2729-8	14SLB050304	02 JUN 1525	03 JUN	SL
WP2729-9	15SLB010405	02 JUN 1220		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	2	135.00	270.00
Volatile Organics by 8260B	SW8260	2	85.00	170.00
Solids-Total Residue (TS)	CLP/CIP SO	2	0.00	0.00
Total Combustible Organics	ASTM D2974	2	30.00	60.00
Wet Lab Subcontract		2	60.00	120.00
TOTALS		2	310.00	620.00

LABORATORY ORDER CONTINUED ON PAGE 2

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MC 10/14/99

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 2

ORDER NO WP-2729

Project Manager: Andrea J. Colby

REPORT TO: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 06/03/99
PHONE: 850/385-985
FAX: 850/385-9860
DUE: 03 JUL
FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
661 ANDERSEN DRIVE, FOSTER PLAZA VII
PITTSBURGH, PA 15220-2745

PHONE: 412/921-7090
PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: R. FRANKLIN

DELIVERED BY: FEDEX

DISPOSE: AFTER 02 AUG

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
4	WP2729-10	14TL00401	02 JUN	03 JUN	SL

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	1	85.00	85.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
5	WP2729-11	29SLB050809	02 JUN 1055	03 JUN	SL

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Wet Lab Subcontract		1	75.00	75.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
6	WP2729-1	14SLB020203	02 JUN 1450	03 JUN	SL
	WP2729-2	14SLB020203D	02 JUN 1450		
	WP2729-4	15SLB020405D	02 JUN 1230		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	3	135.00	405.00
Volatile Organics by 8260B	SW8260	3	85.00	255.00
Solids-Total Residue (TS)	CLP/CIP SO	3	0.00	0.00
Wet Lab Subcontract		3	75.00	225.00

TOTALS		3	295.00	885.00
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LABORATORY ORDER CONTINUED ON PAGE 3

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h. r. l. u. d. a. s.

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 3

ORDER NO WP-2729

Project Manager: Andrea J. Colby

RF RT TO: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 06/03/99

PHONE: 850/385-9899

FAX: 850/385-9860

DUE: 03 JUL

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
661 ANDERSEN DRIVE, FOSTER PLAZA VII
PITTSBURGH, PA 15220-2745

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: R. FRANKLIN

DELIVERED BY: FEDEX

DISPOSE: AFTER 02 AUG

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
7 WP2729-7	15SLB020405	02 JUN 1230	03 JUN	SL

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	135.00	135.00
Volatile Organics by 8260B	SW8260	1	85.00	85.00
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Wet Lab Subcontract		1	185.00	185.00
TOTALS		1	405.00	405.00

ORDER NOTE: QC-IV NFESC-D
DD(KAS007QC-DB3)
CNC CHARLESTON

REPORT COPY: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.
PITTSBURGH, PA 15220
REPORT & DISK

PRICE: With Report

TOTAL ORDER AMOUNT \$2,840.00
This is NOT an Invoice

AJC/BKR/WEST.AJC(dw)

06-14 Please contact KATAHDIN ANALYTICAL SERVICES promptly if you have any questi

0000009

10/14/99

CASE NARRATIVE
for
Katahdin Analytical
Westbrook, ME
Former Charleston Naval Complex Site
SDG #96058S

June 21, 1999

Laboratory Identification:

General Engineering Laboratories, Inc. (GEL)

Mailing Address:

P.O. Box 30712
Charleston, SC 29417

Express Mail Delivery and Shipping Address:

2040 Savage Rd
Charleston, SC 29414

Telephone Number:

(843) 556-8171

Summary:

Sample receipt

The samples from the former Charleston Naval Complex site arrived at General Engineering Laboratories, Inc., Charleston, SC on June 1 and 2, 1999, for environmental analyses. All sample containers arrived without any visible signs of tampering or breakage. The samples were delivered with chain of custody documentation and signatures.

The following samples were received by the laboratory:

<u>Laboratory Identification</u>	<u>Sample Description</u>
9906058-01	29SLB060809
9906097-01	14SLB020203
9906097-02	14SLB020203D
9906097-03	14SLB050304
9906097-04	15SLB010405



9906097-05	15SLB020405
9906097-06	15SLB020405D
9906097-07	29SLB050809

Case Narrative

Sample analyses were conducted using methodology as outlined in General Engineering Laboratories Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are listed below by analytical parameter.

Internal Chain of Custody:

Custody was maintained for all samples.

Data Package:

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, and General Chemistry.

The following are definitions of reporting limits used at General Engineering Laboratories:

DL Detection Limit: The minimum level of an analyte that can be determined (identified not quantified) with 99% confidence. The values are normally achieved by preparing and analyzing seven aliquots of laboratory water spiked 1 to 5 times the estimated MDL, taking the standard deviation and multiplying it against the one-tailed t-statistic at 99%. This computed value is then verified for reasonableness by repeating the study using the concentration found in the initial study, calculating an F-ratio, and computing the final limit. Sample specific preparation and dilution factors are applied to these limits when they are reported.

The detection limit is the minimum concentration of a substance that can be identified, measured, and reported with 99% confidence that the analyte concentration is above zero. It answers the question "Is It Present."

QL Quantitation Limit: The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The QL is generally 5 to 10 times the MDL. However, it may be nominally chosen within these guidelines to simplify data reporting. For many analytes the QL analyte concentration is selected as the lowest non-zero standard in the calibration curve.

Sample QL's are highly matrix-dependent. Sample specific preparation and dilution factors are applied to these limits when they are reported.

The QL is always \geq DL.



This data package, to the best of my knowledge, is in compliance with technical and administrative requirements.



Valerie S. Davis
Project Manager

fc:saic9906058%



Case Narrative for
KATA
SDG# 96058S

TOTAL PETROLEUM HYDROCARBONS

Analytical Batch Number: 151686

Analytical Method: SW846 9071A

<u>Laboratory Number</u>	<u>Sample Description</u>
9906097-01	14SLB020203
9906097-02	14SLB020203D
9906097-05	15SLB020405
9906097-06	15SLB020405D
9906097-07	29SLB050809
QC621595	Blank
QC621596	Laboratory Control Sample
QC621597	Matrix Spike of 9906097-01
QC621598	Duplicate of 9906097-01
QC621599	Matrix Spike of 9906242-01
QC621600	Duplicate of 9906242-01

Instrument Calibration:

The instrument was properly calibrated.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spikes were run on the following Sample Numbers.

9906097-01 and 9906242-01

All analyte recoveries in the matrix spikes were within the required acceptance limits.

Laboratory Control Samples:

All analyte recoveries in the laboratory control sample were within the required acceptance limits.

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

TOTAL ORGANIC CARBON

Analytical Batch Number: 150724

Analytical Method: SW846 9060 Modified

<u>Laboratory Number</u>	<u>Sample Description</u>
9906058-01	29SLB060809
9906097-03	14SLB050304
9906097-04	15SLB010405
QC617934	Blank
QC617935	Duplicate of 9906058-01
QC617936	Post Spike of 9906058-01
QC617937	Laboratory Control Sample

Sample Preparation:

All samples were prepared in accordance with accepted procedures. The method quoted is only for liquid samples. It is modified to handle soils analysis.

Instrument Calibration:

The instrument used was a Dohrmann DC-190 high temperature combustion TOC analyzer with a Dohrmann solids boat sampler. The instrument was properly calibrated on the day of the analysis.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The post spike was run on the following Sample Number.

9906058-01

All analyte recoveries in the post spike were within the required acceptance limits.

Laboratory Control Samples:

All analyte recoveries in the laboratory control sample were within the required acceptance limits.

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

Dilutions:

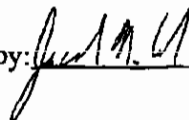
None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

Additional Comments:

TOC solid samples are are tested to determine if inorganic carbon such as carbonates and bicarbonates are present in the sample. If so, the sample is acidified to remove the inorganic carbon, then dried in a low temperature oven. Because the sample portion is dried before analysis, the percent moisture correction is not applied to the TOC solid result.

The preceding narratives have been reviewed by:  Date: 06/27/99

CHAIN OF CUSTODY RECORD

9906058%

General Engineering Laboratories, Inc.
2040 Savage Road
Charleston, South Carolina 29417
P.O. Box 30712
Charleston, South Carolina 29417
(803) 556-8171

[illegible]

White = sample collector Yellow = file Pink = with report

CHAIN OF CUSTODY RECORD

Page ____ of ____

09060971

Client Name/Facility Name <i>Katahdin Analytical</i>				SAMPLE ANALYSIS REQUIRED (x) - use remarks area to specify specific compounds or methods																	Remarks	
Collected by/Company <i>Tetra tech NUS</i>				# OF CONTAINERS	pH, conductivity	TOC/DOC	TOX	Chloride, Fluoride, Sulfide	Nitrite/Nitrate	VOC - Specify Method Required	METALS - specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Coliform - specify type	TPH		
SAMPLE ID	DATE	TIME	WELL																			SOIL
-01 14SLB020203	6/29	1450																				
-02 14SLB020203D	6/29	1450																				
-03 14SLB050304	"	1525																				
-04 15SLB010405	"	1220																				
-05 15SLB020405	"	1230																				
-06 15SLB020405D	"	1230																				
-07 29SLB050809	"	1055																				
Relinquished by:	Date:	Time:	Received by:				Relinquished by:				Date:	Time:	Received by:									
<i>[Signature]</i>	6/29	1740	<i>[Signature]</i>																			
Relinquished by:	Date:	Time:	Received by lab by:				Date:	Time:	Remarks:													
			<i>[Signature]</i>				6/29	1740														

White : Sample collector Yellow = file Pink = with report

40625
↓
0.2
↓
0.1
↓

FEDERAL SAMPLE RECEIPT REVIEW

Client KATA

Received by SA

Date 6/2/99

GEL COOLER ☒ GEL POLY COOLER ☐ CLIENT COOLER ☐ OTHER ☐

SAMPLE REVIEW CRITERIA		YES	NO	COMMENTS/QUALIFIERS
1.	Were shipping containers received intact and sealed? If no, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.	Was the Shipment screened following the radiochemistry survey procedure (EPI SOP S-007)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Were the survey results negative? If no, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Are any of the samples identified by the client as radioactive? If yes, did client provide RAD activity?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3.	Were chain of custody documents included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4.	Were chain of custody documents completed correctly? (Ink, signed, match containers)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.	Were all sample containers properly labeled?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6.	Were proper sample containers received?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7.	Preserved samples checked for pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
8.	Were samples preserved correctly? If no, list samples & tests	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
9.	Shipping container temperature checked?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10.	Was shipping container temperature within specifications ($4 \pm 2^\circ \text{C}$)? If no, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4°C
11.	Is temperature documented on the Chain of Custody?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
12.	Were samples received within holding time? if No, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13.	Were VOA vials free of headspace?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
14.	ARCOC# IF REQUIRED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
15.	SDG# IF REQUIRED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

REVIEW Francis

DATE 6/2/99

SA - SEALS ATTACHED NSA - NO SEALS ATTACHED

FEDERAL SAMPLE RECEIPT REVIEW

Client KATA

Received by CG

Date 6/2/99

GEL COOLER___ GEL POLY COOLER___ CLIENT COOLER ☒ OTHER___

SAMPLE REVIEW CRITERIA		YES	NO	COMMENTS/QUALIFIERS
1.	Were shipping containers received intact and sealed? If no, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.	Was the Shipment screened following the radiochemistry survey procedure (EPI SOP S-007)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Were the survey results negative? If no, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Are any of the samples identified by the client as radioactive? If yes, did client provide RAD activity?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3.	Were chain of custody documents included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4.	Were chain of custody documents completed correctly? (Ink, signed, match containers)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.	Were all sample containers properly labeled?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6.	Were proper sample containers received?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7.	Preserved samples checked for pH?	<input type="checkbox"/>	<input type="checkbox"/>	
8.	Were samples preserved correctly? If no, list samples & tests	<input type="checkbox"/>	<input type="checkbox"/>	Soil
9.	Shipping container temperature checked?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10.	Was shipping container temperature within specifications ($4^{\circ} \pm 2^{\circ} \text{C}$)? If no, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4°C
11.	Is temperature documented on the Chain of Custody?	<input type="checkbox"/>	<input type="checkbox"/>	
12.	Were samples received within holding time? if No, notify Project Manager	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13.	Were VOA vials free of headspace?	<input type="checkbox"/>	<input type="checkbox"/>	
14.	ARCO# IF REQUIRED	<input type="checkbox"/>	<input type="checkbox"/>	
15.	SDG# IF REQUIRED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	96097

REVIEW Francis

DATE 6/2/99

SA - SEALS ATTACHED NSA - NO SEALS ATTACHED

Client: Katahdin Analytical
340 County Road
Westbrook, Maine 04092
Contact: Ms. Andrea Colby
Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 29SLB060809
Lab ID : 9906058-01
Matrix : Soil
Date Collected : 06/01/99
Date Received : 06/01/99
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Evaporative Loss @ 105 C		8.00	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	1
Total Organic Carbon		6780	43.1	100	mg/kg	1.0	LS	06/18/99	1725	150724	2

M = Method	Method-Description
M 1	EPA 3550
M 2	SW846 9060 Modified

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

Data reported in mass/mass units is reported as 'dry weight'.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (843) 769-7391.

Reviewed By



00000000 01

Client: Katahdin Analytical
340 County Road
Westbrook, Maine 04092
Contact: Ms. Andrea Colby
Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 29SLB050809
Lab ID : 9906097-07
Matrix : Soil
Date Collected : 06/02/99
Date Received : 06/02/99
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		9150	54.0	108	mg/kg	1.0	AAT	06/22/99	0950	151686	1
Evaporative Loss @ 105 C		7.00	1.00	1.00	wt%	1.0	CJ	06/03/99	1500	150650	2

M = Method	Method-Description
M 1	SW846 9071A
M 2	EPA 3550

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

Data reported in mass/mass units is reported as 'dry weight'.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (843) 769-7391.

Reviewed By

Janet A. Colby



QC Summary Report

Project Description: Former Naval Complex

cc: KATA00199

Lab. Sample ID: 9906097%

Report Date: June 22, 1999

Page 1 of 1

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
General Chemistry													
QC621595	BLANK	151686											
Total Rec. Petro. Hydrocarbons						0.00	mg/kg				AAT	06/22/99	0950
QC621598	9906097-01DUP	151686											
Total Rec. Petro. Hydrocarbons				783		1020	mg/kg	26.3					
QC621600	9906242-01DUP	151686											
Total Rec. Petro. Hydrocarbons				1560		1910	mg/kg	20.0					
QC621596	LCS	151686											
Total Rec. Petro. Hydrocarbons			11000			9840	mg/kg		89.6	(70.0 - 116.)			
QC621597	9906097-01MS	151686											
Total Rec. Petro. Hydrocarbons			13200	783		12600	mg/kg		90.0	(70.0 - 130.)			
QC621599	9906242-01MS	151686											
Total Rec. Petro. Hydrocarbons			12100	1560		13000	mg/kg		94.6	(70.0 - 130.)			
QC617634	BLANK	150650											
Evaporative Loss @ 105 C						0.00	wt%				GJ	06/03/99	1500
QC617632	9906058-01DUP	150650											
Evaporative Loss @ 105 C				8.00		8.00	wt%	0.00					
QC617934	BLANK	150724											
Total Organic Carbon						-2.83	mg/kg				LS	06/18/99	1628
QC617935	9906058-01DUP	150724											
Total Organic Carbon				6780		6830	mg/kg	0.764			LS	06/18/99	1740
QC617937	LCS	150724											
Total Organic Carbon			3750			4420	mg/kg		118	(88.0 - 130.)	LS	06/18/99	1612
QC617936	9906058-01PS	150724											
Total Organic Carbon			10000	6780		16200	mg/kg		94.2	(73.0 - 129.)	LS	06/18/99	1747

Notes:

The qualifiers in this report are defined as follows:

J indicates presence of analyte < RL (Report Limit)

U indicates presence of analyte < DL (Detect Limit)

n/a indicates that spike recovery limits do not apply when

sample concentration exceeds spike conc by a factor of 4 or more

S. W. COLE ENGINEERING, INC.

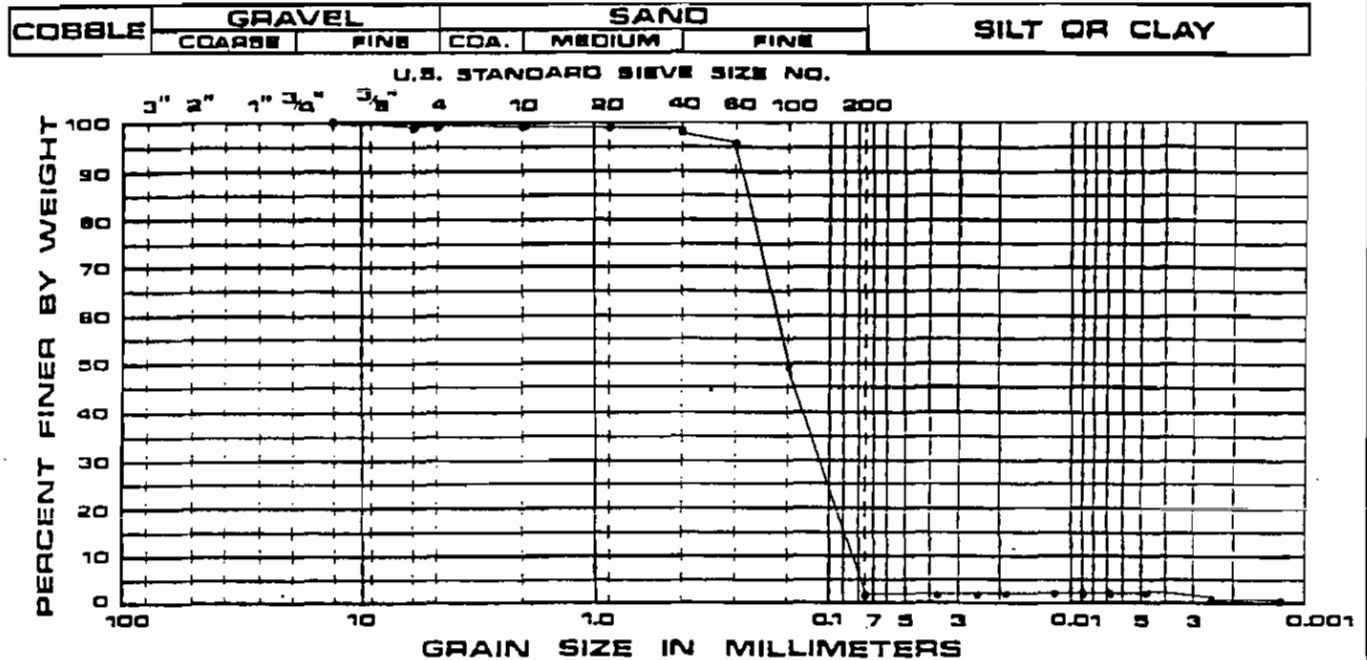
R E P O R T O F G R A D A T I O N
ASTM C-117, C-136

Project No. 99008
Date 06/07/1999

Project MISCELLANEOUS
Client KATAHDIN ANALYTICAL
Sample No. 21, SAND, WP2703-10

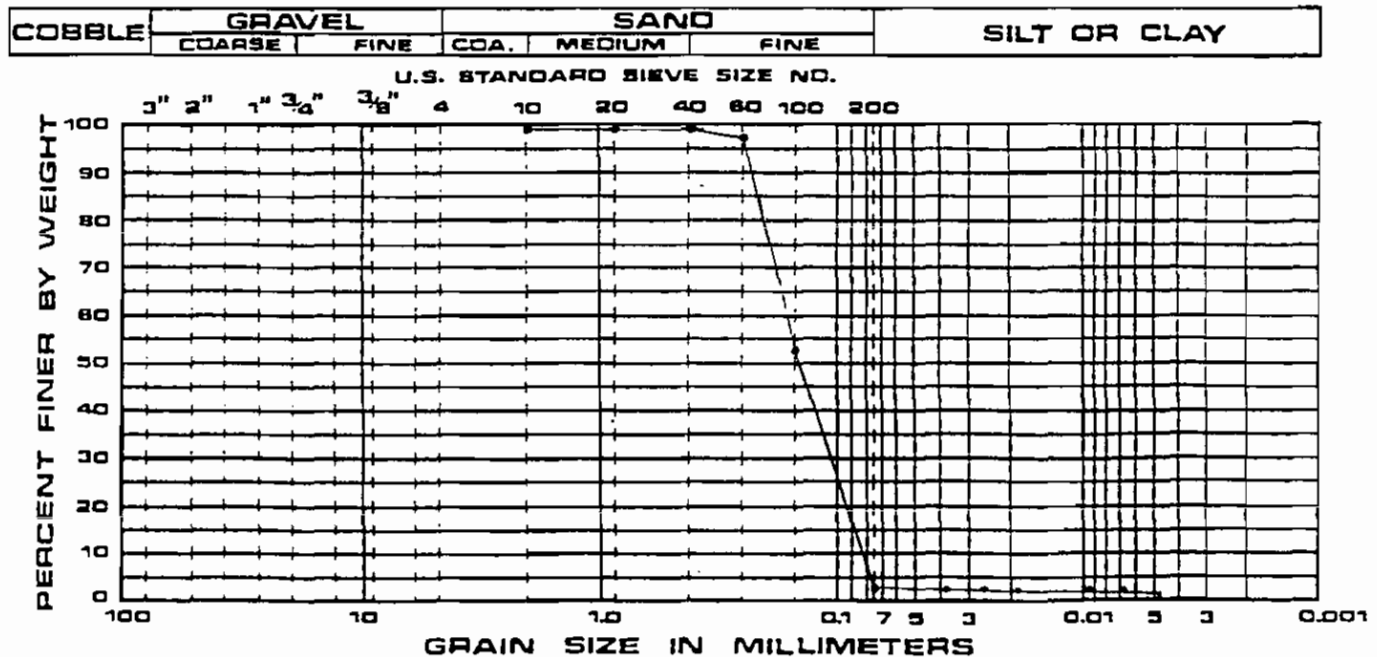
<u>Sieve Size</u>	<u>Percent Passing</u>	<u>PROJECT</u> <u>Specifications %</u>
1/2 "	100.0	
1/4 "	99.6	
# 4	99.6	
# 10	99.4	
# 20	99.1	
# 40	98.8	
# 60	96.1	
# 100	49.0	
# 200	2.2	

GRAIN SIZE ANALYSIS



PLOT	SOURCE	SAMP.	DEPTH	CLASSIFICATION	W
•	WP-270 9-10	21			

GRAIN SIZE ANALYSIS



PLOT	SOURCE	SAMP.	DEPTH	CLASSIFICATION	W
•		22			



September 15, 1999

Mr. Paul Calligan

Tetra Tech Nus

1401 Oven Park Dr., Suite 102

Tallahassee, FL 32308

RE: Katahdin Lab Number: WP3570
Project ID: CNC Charleston
Project Manager: Ms. Andrea J. Colby
Sample Receipt Date(s): 8/10/99

Dear Mr. Calligan:

Please find enclosed the following information:

- * Report of Analysis
- * Quality Control Data Summary
- * Chain of Custody
- * Confirmation

Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact the project manager listed above. This cover letter is an integral part of the ROA.

We appreciate your continued use of our laboratory and look forward to working with you in the future. The following signature indicates technical review and acceptance of the data.

Sincerely,

KATAHDIN ANALYTICAL SERVICES

Maria Crouch
Authorized Signature

09/15/99
Date



**SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
TETRA TECH NUS
CASE CNC CHARLESTON**

Sample Receipt

The following samples were received on August 10, 1999 and were logged in under Katahdin Analytical Services work order number WP3570 for a hardcopy due date of September 9, 1999.

<u>KATAHDIN</u> <u>Sample No.</u>	<u>TTNUS</u> <u>Sample Identification</u>
WP3570-1	19GLM0101
WP3570-2	19GLM0401
WP3570-3	19GLM0201
WP3570-4	29GLM0601
WP3570-5	33GLM0401
WP3570-6	33GLM0601
WP3570-7	41GLM0101D
WP3570-8	41GLM0701
WP3570-9	41GLM0601
WP3570-10	33GLM0201D
WP3570-11	33GLM0101
WP3570-12	33GLM0201
WP3570-13	33GLM0501
WP3570-14	41GLM0301
WP3570-15	41GLM0101
WP3570-16	41GLM0501
WP3570-17	33GLM0301
WP3570-18	33TL00101

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

Sample analyses have been performed by the methods as noted herein.

Volatile Organic Analysis

Seventeen aqueous samples were received by the Katahdin Analytical Services, Inc. GC/MS laboratory on August 10, 1999 and were specified to be analyzed by USEPA method 8260B for the analytes benzene, toluene, ethylbenzene, xylenes, MTBE, naphthalene, and EDB.

Analyses for this workorder were performed on the 5970-Q instrument. A VSTD050 (50 ppb



standard) was used for the continuing calibration standard. Internal standard and surrogate compounds were also spiked at 50 ppb.

Batch QC (VBLK, and LCS) was performed in each twelve-hour window. Results are included in this data package. The LCS QC samples were spiked with the entire list of compounds quantitated for at 50 ppb. A matrix spike/matrix spike duplicate pair was performed on sample WP3570-14.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" (software-generated) on the pertinent quantitation reports. All "M" flags have been dated and initialed by the analyst performing the integration. In addition, all "M" flags have been reviewed and approved by the GC/MS supervisor. Copies of each manual integration are included in the pertinent quantitation reports.

No other protocol deviations were noted by the volatile organics staff.

Semivolatile Organics Analysis

Seventeen aqueous samples were received by Katahdin Analytical Services laboratory on August 10, 1999 for analysis in accordance with 8270C for a client specified PAH list of analytes.

Extraction of the samples occurred following USEPA method 3510 on August 13, 1999. A laboratory control spike, consisting of all PAH analytes spiked into organic free water, was extracted in the batch, along with a matrix spike/matrix spike duplicate pair on sample WP3570-4.

Initial analyses of samples WP3570-1 and -2 yielded target analyte concentrations over the upper limit of the calibration curve. The analysis of sample WP3570-1 also yielded a low recovery of the surrogate terphenyl-d14. Re-analyses occurred at 1:2 dilutions for each. Both sets of data for sample WP3570-2 are included in this data package. Sample WP3570-1 was reextracted on August 23, 1999, following USEPA method 3510, outside of holding times. Surrogate recoveries for this reextracted sample met QC limits. All three sets of data for this sample are included in the data package.

Initial analysis of sample WP3570-3 yielded a low recovery of the surrogate terphenyl-d14. Re-extraction occurred on August 23, 1999, following USEPA method 3510. The re-extracted sample also had a low recovery of the surrogate terphenyl-d14, confirming matrix interference. Both sets of data are included in the data package.

Analysis of the QC sample WP3570-4MS yielded a low recovery of the surrogate terphenyl-d14. In accordance with the method, no action was taken with this QC sample.

Initial analysis of sample WP3570-17 yielded internal standard area recovery deviations. Re-analysis yielded a similar result, confirming matrix interference. Both sets of data are included in this data package.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" by the data system. All manual integrations have been dated and initialed by the responsible analyst. Copies of each manual integration are included in the data package. All manual integrations have been reviewed and approved by the GC/MS supervisor.

No other protocol deviations were noted by the semivolatiles organics staff.

Wet Chemistry Analysis

For work order WP3570 analyses for Nitrate (E300) and Sulfate (E300) were performed according to the U.S. EPA "Methods for the Determination of Inorganic Substances in Environmental Samples", EPA 600/R-93/100, August 1993. All samples were run within laboratory hold time.

The wet chemistry staff noted no protocol deviations.

KATAHDY ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
Tel. (207) 874-2400
Fax (207) 775-4029

LAB (WORK ORDER) # WP3570 (1)

PAGE: 1 OF 3

COOLER: 1 OF 3

COC# _____

SDG# _____

DATE / TIME RECEIVED: 08-10-99 ~ 0900

DELIVERED BY: FEDEX

RECEIVED BY: BKR

LIMS ENTRY BY: SW

LIMS REVIEW BY / PM: KAP

CLIENT: Tetrated SC

PROJECT: CNC CHARLESTON

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
6. SAMPLES RECEIVED AT 4°C +/- 2?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
ICE / ICE PACKS PRESENT <u>Y</u> or <u>N</u> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN): <u>SC</u>					

LOG - IN NOTES⁽¹⁾:

33GLM0301: All 3 vials arrived broken - called client on 8/10/99. They will resample.
33GLM 101D as written on COC was written 33GLM 201D on containers. called client on 8/10/99
Logged in according to C.O.C. Log in as per
per client request on 8/11/99, 19GLM0501 should be 19GLM0201. KAP 8/11/99 Containers per client request

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative added.

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
Tel. (207) 874-2400
Fax (207) 775-4029

LAB (WORK ORDER) # WP 3570

PAGE: 2 OF 3

COOLER: 2 OF 3

CLIENT: Tetra Tech - SC

COC# _____

SDG# _____

DATE / TIME RECEIVED: 08-10-99 ~ 0900

DELIVERED BY: EEDG

RECEIVED BY: BKL

LIMS ENTRY BY: SW

LIMS REVIEW BY / PM: KMP

PROJECT: CNC CHARLESTON

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>0.3</u>	<u>called client on 8/10/99. Not a problem with analysis. 8/10/99</u>
6. SAMPLES RECEIVED AT 4°C +/- 2° ICE / ICE PACKS PRESENT <u>Y</u> or <u>N</u> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u> (RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>N/A</u>		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>INFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN): <u>SC</u>					

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this sq. (and additional sheets if necessary) to document samples that are received broken, compromised, C-O-C discrepancies, radiation checks, residual chlorine check, res: pH
check if rel. If samples required pH adjustment, record volume and type of preservative add.

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
Tel. (207) 874-2400
Fax (207) 775-4029

LAB (WORK ORDER) # WP 3570

PAGE: 3 OF 3

COOLER: 3 OF 3

COC# _____

SDG# _____

DATE / TIME RECEIVED: 08-10-99 ~ 0900

DELIVERED BY: FED EX

RECEIVED BY: BKR

LIMS ENTRY BY: SW

LIMS REVIEW BY / PM: KAP

CLIENT: Tetradedh SC

PROJECT: CNC CHARLESTON

Wm

	YES	NO	EXCEPTIONS
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. SAMPLES RECEIVED AT 4°C +/- 2?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(ICE) ICE PACKS PRESENT (Y) or N?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. TRIP BLANK PRESENT IN THIS COOLER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A

COMMENTS _____ RESOLUTION _____

TEMP BLANK TEMP (°C) = 0.5

COOLER TEMP (°C) = NA

(RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)

13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP NFESC ACOE AFCEE OTHER (STATE OF ORIGIN): SC

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative added.



340 County Road No. 5
P.O. Box 720
Westbrook, ME 04098
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE PRINT IN PEN

Page 1 of 2

Client Tetra Tech NUS Contact Brynn Howze Phone # (843) 534 4925 Fax #
Address NH 21 Ave H City N. Charleston State SC Zip Code
Purchase Order # Proj. Name / No. Katahdin Quote #

Bill (if different than above) Address

Sampler (Print / Sign) Jeff Alexander / [Signature] Copies To: PO BOX ANDERSON

LAB USE ONLY WORK ORDER #: WP 3570 KATAHDIN PROJECT MANAGER

REMARKS:

SHIPPING INFO: ☒ FED EX ☐ UPS ☐ CLIENT
AIRBILL NO: 813402904440
TEMP °C ☐ TEMP BLANK ☐ INTACT ☐ NOT INTACT

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	ANALYSIS AND CONTAINER TYPE PRESERVATIVES									
					Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON
	19GLM0101	8/6/99/1107	GW	5	3	2								
	19GLM0301	1/110	GW	1	3	2								
	19GLM0501	1/1158	GW	1	3	2								
	29GLM0601	8/7/99/1510		1	3	2								
	33GLM0301	1/0932		1	3	2								
	33GLM0401	1/0930		1	3	2								
	33GLM0601	1/0935		1	3	2								
	33GLM0101	8/3/99/1258		9	3	2	3	1						
	33GLM0201	1/1300		1	3	2	3	1						
	33GLM0501	1/1259		1	3	2	3	1						
	41GLM0301	8/9/99/0929		1	3	2	3	1						
	41GLM0101	1/0920		1	3	2	3	1						
	41GLM0501	1/0936		1	3	2	3	1						
	41GLM0101D	1/—		5	3	2								
	41GLM0701	1/1540		1	3	2								
	41GLM0601	1/1542		1	3	2								

COMMENTS

Relinquished By: (Signature) <u>[Signature]</u>	Date / Time <u>8/9/99 1830</u>	Received By: (Signature) <u>813402904440</u>	Relinquished By: (Signature) <u></u>	Date / Time <u></u>	Received By: (Signature) <u>[Signature]</u>
Relinquished By: (Signature) <u></u>	Date / Time <u></u>	Received By: (Signature) <u></u>	Relinquished By: (Signature) <u></u>	Date / Time <u></u>	Received By: (Signature) <u></u>

CHAIN of CUSTODY

PLEASE PRINT IN PEN

Page 2 of 2

Client	Tetra Tech NUS	Contact	Phone #	Fax #
			(843) 554 4925	

Ad. _____ City _____ State _____ Zip Code _____

Purchase Order #	Page 2	Proj. Name / No.	Katahdin Quote #
------------------	--------	------------------	------------------



Bill (if different than above) _____ Address _____

Sampler (Print / Sign) JEFF Alexander DEREK ANDERSON Copies To:

LAB USE ONLY	WORK ORDER #: WP3570 - *	ANALYSIS AND CONTAINER TYPE PRESERVATIVES
--------------	--------------------------	--

[illegible][illegible][illegible]

COMMENTS

Relinquished By: (Signature) 	Date / Time 3/9/99 1830	Received By: (Signature) 813402964440	Relinquished By: (Signature)	Date / Time 08-10-99 0500	Received By: (Signature) 
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 1

ORDER NO WP-3570

Project Manager: Andrea J. Colby

REPORT TO: PAUL CALLIGAN
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 08/10/99

PHONE: 850/385-989

FAX: 850/385-9860

DUE: 09 SEP

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
FOSTER PLAZA 7, 661 ANDERSEN DR.
PITTSBURGH, PA 15220

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO#68

SAMPLED BY: J.ALEXANDER

DELIVERED BY: FEDEX

DISPOSE: AFTER 09 OCT

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WP3570-1	19GLM0101	06 AUG 1107	10 AUG	AQ
	WP3570-2	19GLM0401	06 AUG 1110		
	WP3570-3	19GLM0201	06 AUG 1158		
	WP3570-4	29GLM0601	07 AUG 1510		
	WP3570-5	33GLM0401	07 AUG 0930		
	WP3570-6	33GLM0601	07 AUG 0935		
	WP3570-7	41GLM0101D	09 AUG		
	WP3570-8	41GLM0701	09 AUG 1540		
	WP3570-9	41GLM0601	09 AUG 1542		
	WP3570-10	33GLM0201D	08 AUG		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	10	75.00	750.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	10	125.00	1250.00
TOTALS		10	200.00	2000.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2	WP3570-11	33GLM0101	08 AUG 1258	10 AUG	AQ
	WP3570-12	33GLM0201	08 AUG 1300		
	WP3570-13	33GLM0501	08 AUG 1259		
	WP3570-14	41GLM0301	09 AUG 0929		
	WP3570-15	41GLM0101	09 AUG 0920		
	WP3570-16	41GLM0501	09 AUG 0936		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	6	75.00	450.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	6	125.00	750.00
GC Subcontract		6	95.00	570.00
Nitrogen, Nitrate (as N)	E300	6	30.00	180.00
Sulfate (as SO4)	E300	6	0.00	0.00
TOTALS		6	325.00	1950.00

LABORATORY ORDER CONTINUED ON PAGE 2

0000079
01/01/99

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 2

ORDER NO WP-3570

Project Manager: Andrea J. Colby

RT TO: PAUL CALLIGAN
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 08/10/99

PHONE: 850/385-9899

FAX: 850/385-9860

DUE: 09 SEP

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
FOSTER PLAZA 7, 661 ANDERSEN DR.
PITTSBURGH, PA 15220

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO#68

SAMPLED BY: J.ALEXANDER

DELIVERED BY: FEDEX

DISPOSE: AFTER 09 OCT

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
3	WP3570-17	33GLM0301	07 AUG 0932	10 AUG	AQ

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	125.00	125.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
4	WP3570-18	33TL00101	09 AUG	10 AUG	AQ

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	1	75.00	75.00

ORDER NOTE: QC-IV NFESC-D
DD(KAS007QC-DB3)
CNC CHARLESTON

REPORT COPY: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.
PITTSBURGH, PA 15220
REPORT AND DISK

INVOICE: With Report

TOTAL ORDER AMOUNT \$4,150.00

This is NOT an Invoice

AJC/BKR/KP/WEST.KP(dw)

08-19 Please contact KATAHDIN ANALYTICAL SERVICES promptly if you have any questi

0000080
08/10/99



KATAHDIN ANALYTICAL SERVICES

Summary of Report Notes

Report Note	Note Text
#	'#' flag denotes surrogate compound recovery is out of criteria.
\$	'\$' flag denotes surrogate compound recovery is out of criteria. Re-extraction or re-analysis confirmed matrix interference.
E	'E' flag indicates an estimated value. The analyte was detected in the sample at a concentration greater than the standard calibration range.
J	'J' flag denotes an estimated value less than the Laboratory's Practical Quantitation Level.
O-13	Internal standard area(s) are out of criteria. Reanalysis confirmed matrix interference.
O-2	Sample dilution required for quantitation of one or more target analytes; therefore, standard laboratory Practical Quantitation Level (PQL) could not be achieved.
O-6	Sample reextraction was required due to exceedance of quality control criteria. The original extraction was performed within hold time while reextraction was not within hold time. Results for the reextracted sample met all quality control criteria and are reported here.



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: PAUL CALLIGAN
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3570-4
SDG: WP3570
Report Date: 9/13/99
PO No. : N7912-P99264
Project: CTO#68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/18/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0601	AQ	8/7/99	8/10/99	8/13/99	DPD	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZ[<i>a</i>]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[<i>b</i>]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[<i>k</i>]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[<i>a</i>]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3- <i>cd</i>]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[<i>a,h</i>]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[<i>g,h,i</i>]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	66	%	1.0		
2-FLUOROBIPHENYL	63	%	1.0		
TERPHENYL-D14	69	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: PAUL CALLIGAN
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3570-4
SDG: WP3570
Report Date: 9/13/99
PO No. : N7912-P99264
Project: CTO#68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/13/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0601	AQ	8/7/99	8/10/99	8/13/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	97	%	1.0		
1,2-DICHLOROETHANE-D4	87	%	1.0		
TOLUENE-D8	96	%	1.0		
P-BROMOFLUOROBENZENE	94	%	1.0		

Report Notes:

4B
SEMIVOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

SBLK;081399

Lab Name: Katahdin Analytical Services

SDG No.: WP3570

Lab File ID: Z1740

Lab Sample ID: SBLK;081399

Instrument ID: 5972-Z

Date Extracted: 8/13/99

GC Column: RTX-624 ID: 0.18 (mm)

Date Analyzed: 08/16/99

Matrix: (soil/water) WATER

Time Analyzed: 13:03

Level: (low/med) LOW

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
29GLM0601MS	WP3570-4MS	Z1746	8/16/99	5:45:00 PM
29GLM0601MSD	WP3570-4MSD	Z1747	8/16/99	6:31:00 PM
41GLM0101D	WP3570-7	Z1750	8/16/99	8:51:00 PM
41GLM0701	WP3570-8	Z1755	8/17/99	2:23:00 PM
33GLM0201D	WP3570-10	Z1757	8/17/99	3:56:00 PM
33GLM0201	WP3570-12	Z1759	8/17/99	5:30:00 PM
41GLM0301	WP3570-14	Z1761	8/17/99	7:04:00 PM
41GLM0101	WP3570-15	Z1762	8/17/99	7:51:00 PM
41GLM0501	WP3570-16	Z1763	8/17/99	8:38:00 PM
33GLM0301	WP3570-17	Z1764	8/17/99	9:26:00 PM
LCS;081399	LCS;081399	Z1765	8/17/99	10:14:00 PM
33GLM0601	WP3570-6	Z1770	8/18/99	9:25:00 AM
19GLM0101	WP3570-1	Z1771	8/18/99	10:13:00 AM
19GLM0501	WP3570-3	Z1772	8/18/99	11:00:00 AM
19GLM0401	WP3570-2	Z1773	8/18/99	11:49:00 AM
29GLM0601	WP3570-4	Z1774	8/18/99	12:35:00 PM
33GLM0401	WP3570-5	Z1775	8/18/99	1:23:00 PM
41GLM0601	WP3570-9	Z1776	8/18/99	2:10:00 PM
33GLM0101	WP3570-11	Z1777	8/18/99	2:56:00 PM
33GLM0501	WP3570-13	Z1778	8/18/99	3:42:00 PM
33GLM0301	WP3570-17RA	Z1779	8/18/99	4:29:00 PM
19GLM0101	WP3570-1DL	Z1780	8/18/99	5:19:00 PM
19GLM0401	WP3570-2DL	Z1781	8/18/99	6:05:00 PM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: PAUL CALLIGAN
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: SBLK;081399
SDG: WP3570
Report Date: 9/13/99
PO No. : N7912-P99264
Project: CTO#68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/16/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
SBLK;081399	AQ	-	-	8/13/99	DPD	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	46	%	1.0		
2-FLUOROBIPHENYL	48	%	1.0		
TERPHENYL-D14	64	%	1.0		

Report Notes:

Katabdin Analytical Services

8270 LCS Recovery Sheet

Lab File: Z1765

Sample ID: LCS;081399

Date Run: 8/17/99

Analyst: KRT

Time Injected 10:14:00 PM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
2-METHYLNAPHTHALENE	50	47.8	96	70-130
ACENAPHTHENE	50	50.4	101	70-130
ACENAPHTHYLENE	50	50.8	102	70-130
ANTHRACENE	50	55.6	111	70-130
BENZO[A]ANTHRACENE	50	51.2	102	70-130
BENZO[A]PYRENE	50	50.0	100	70-130
BENZO[B]FLUORANTHENE	50	47.7	95	70-130
BENZO[G,H,I]PERYLENE	50	46.7	93	70-130
BENZO[K]FLUORANTHENE	50	58.9	118	70-130
CHRYSENE	50	53.8	108	70-130
DIBENZ[A,H]ANTHRACENE	50	45.0	90	70-130
FLUORANTHENE	50	52.4	105	70-130
FLUORENE	50	49.2	98	70-130
INDENO[1,2,3-CD]PYRENE	50	40.5	81	70-130
NAPHTHALENE	50	48.7	97	70-130
PHENANTHRENE	50	53.3	106	70-130
PYRENE	50	55.6	111	70-130

* Out of Limits

1

0000056

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
WP3570-4	Z1774	8/18/99	12:35:00 PM	KRT	AQ	8270_99
WP3570-4MS	Z1746	8/16/99	5:45:00 PM	KRT	AQ	8270_99
WP3570-4MSD	Z1747	8/16/99	6:31:00 PM	KRT	AQ	8270_99

Compound Name	Native (ug/L)	MS Spk Amount (ug/L)	MSD Spk Amount (ug/L)	MS Result (ug/L)	MSD Result (ug/L)	MS REC (%)	MSD REC (%)	Recovery Limits (%)	RPD (%)	RPD Limit (%)
CHRYSENE	0	47	48	19.8	31.8	*42	66	60-140	*46	30
ACENAPHTHENE	0	47	48	23.1	26.9	*49	*56	60-140	15	30
ACENAPHTHYLENE	0	47	48	24.2	26.6	*51	*55	60-140	9.4	30
ANTHRACENE	0	47	48	24.1	33.6	*51	70	60-140	*33	30
BENZO[A]ANTHRACENE	0	47	48	18.4	30.4	*39	63	60-140	*49	30
BENZO[A]PYRENE	0	47	48	15.1	25.4	*32	*53	60-140	*51	30
BENZO[B]FLUORANTHENE	0	47	48	13.7	23.2	*29	*48	60-140	*51	30
2-METHYLNAPHTHALENE	0	47	48	21.6	23.5	*46	*49	60-140	8.4	30
BENZO[K]FLUORANTHENE	0	47	48	18.0	29.0	*38	60	60-140	*47	30
PYRENE	0	47	48	22.8	32.2	*48	67	60-140	*34	30
DIBENZ[A,H]ANTHRACENE	0	47	48	12.3	22.6	*26	*47	60-140	*59	30
FLUORANTHENE	0	47	48	20.4	31.4	*44	65	60-140	*42	30
FLUORENE	0	47	48	21.5	27.1	*46	*56	60-140	23	30
INDENO[1,2,3-CD]PYRENE	0	47	48	12.1	25.5	*26	*53	60-140	*71	30
NAPHTHALENE	0	47	48	23.3	23.4	*50	*49	60-140	0.43	30
PHENANTHRENE	0	47	48	22.9	28.5	*49	*59	60-140	22	30
BENZO[G,H,I]PERYLENE	0	47	48	12.8	23.0	*27	*48	60-140	*57	30

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBKQ13A

Lab Name: Katahdin Analytical Services

SDG No.: WP3570

Lab File ID: Q6291

Lab Sample ID: VBKQ13A

Date Analyzed: 08/13/99

Time Analyzed: 11:30

GC Column: RTX-502 ID: 0.53 (mm)

Heated Purge: (Y/N) N

Instrument ID: 5970-Q

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCSQ13A	LCSQ13A	Q6290	8/13/99	10:40:00 AM
19GLM0101	WP3570-1	Q6297	8/13/99	3:39:00 PM
19GLM0401	WP3570-2	Q6298	8/13/99	4:18:00 PM
19GLM0501	WP3570-3	Q6299	8/13/99	4:56:00 PM
29GLM0601	WP3570-4	Q6300	8/13/99	5:35:00 PM
33GLM0401	WP3570-5	Q6301	8/13/99	6:14:00 PM
33GLM0601	WP3570-6	Q6302	8/13/99	6:53:00 PM
41GLM0101D	WP3570-7	Q6303	8/13/99	7:32:00 PM
41GLM0701	WP3570-8	Q6304	8/13/99	8:11:00 PM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: PAUL CALLIGAN
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKQ13A
SDG: WP3570
Report Date: 9/13/99
PO No. : N7912-P99264
Project: CTO#68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/13/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKQ13A	AQ	-	-	8/13/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	89	%	1.0		
1,2-DICHLOROETHANE-D4	81	%	1.0		
TOLUENE-D8	94	%	1.0		
P-BROMOFLUOROBENZENE	93	%	1.0		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Q6290

Sample ID: LCSQ13A

Date Run: 8/13/99

Analyst: KMC

Time Injected 10:40:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	57.0	114	60-140
BENZENE	50	57.4	115	60-140
ETHYLBENZENE	50	57.3	115	60-140
MTBE	50	51.8	104	60-140
NAPHTHALENE	50	53.7	107	60-140
TOLUENE	50	57.0	114	60-140
TOTAL XYLENES	150	160	107	60-140

*** Out of Limits**

1

0000063

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBKQ17A

Lab Name: Katahdin Analytical Services

SDG No.: WP3570

Lab File ID: Q6338

Lab Sample ID: VBKQ17A

Date Analyzed: 08/17/99

Time Analyzed: 10:56

GC Column: RTX-502 ID: 0.53 (mm)

Heated Purge: (Y/N) N

Instrument ID: 5970-Q

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCSQ17A	LCSQ17A	Q6337	8/17/99	9:49:00 AM
41GLM0301	WP3570-14	Q6343	8/17/99	2:38:00 PM
41GLM0301MS	WP3570-14MS	Q6344	8/17/99	3:17:00 PM
41GLM0301MSD	WP3570-14MSD	Q6345	8/17/99	3:56:00 PM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: PAUL CALLIGAN
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: VBLKQ17A
SDG: WP3570
Report Date: 9/13/99
PO No. : N7912-P99264
Project: CTO#68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/17/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKQ17A	AQ	-	-	8/17/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	93	%	1.0		
1,2-DICHLOROETHANE-D4	80	%	1.0		
1,2-DICHLOROETHANE-D8	102	%	1.0		
P-BROMOFLUOROBENZENE	100	%	1.0		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Q6337

Sample ID: LCSQ17A

Date Run: 8/17/99

Analyst: KMC

Time Injected 9:49:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	55.0	110	60-140
BENZENE	50	48.5	97	60-140
ETHYLBENZENE	50	53.7	107	60-140
MTBE	50	43.2	86	60-140
NAPHTHALENE	50	53.5	107	60-140
TOLUENE	50	51.4	103	60-140
TOTAL XYLENES	150	149	99	60-140

*** Out of Limits**

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0000069

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
WP3570-14	Q6343	8/17/99	2:38:00 PM	KMC	AQ	8260_99
WP3570-14MS	Q6344	8/17/99	3:17:00 PM	KMC	AQ	8260_99
WP3570-14MSD	Q6345	8/17/99	3:56:00 PM	KMC	AQ	8260_99

Compound Name	Native (ug/L)	MS Spk Amount (ug/L)	MSD Spk Amount (ug/L)	MS Result (ug/L)	MSD Result (ug/L)	MS REC (%)	MSD REC (%)	Recovery Limits (%)	RPD (%)	RPD Limit (%)
TOTAL XYLENES	0	150	150	157	159	104	106	60-140	1.3	20
TOLUENE	0	50	50	53.1	51.6	106	103	60-140	2.9	20
NAPHTHALENE	0	50	50	49.5	56.0	99	112	60-140	12	20
MTBE	0	50	50	43.6	42.9	87	86	60-140	1.6	20
ETHYLBENZENE	0	50	50	56.6	56.3	113	112	60-140	0.53	20
BENZENE	0	50	50	50.8	48.4	102	97	60-140	4.8	20
1,2-DIBROMOETHANE	0	50	50	53.6	53.3	107	106	60-140	0.56	20



August 31, 1999

Mr. Paul Calligan
Tetra Tech Nus
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

RE: Katahdin Lab Number: WP3417
Project ID: CNC Charleston
Project Manager: Ms. Andrea J. Colby
Sample Receipt Date(s): 7/28/99

Dear Mr. Calligan:

Please find enclosed the following information:

- * Report of Analysis
- * Quality Control Data Summary
- * Chain of Custody
- * Confirmation

Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact the project manager listed above. This cover letter is an integral part of the ROA.

We appreciate your continued use of our laboratory and look forward to working with you in the future. The following signature indicates technical review and acceptance of the data.

Sincerely,

KATAHDIN ANALYTICAL SERVICES

Mary S. Monice
Authorized Signature

8.31.99
Date

SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
TETRA TECH NUS
CASE CNC CHARLESTON

Sample Receipt

The following samples were received on July 28, 1999 and were logged in under Katahdin Analytical Services work order number WP3417 for a hardcopy due date of August 27, 1999.

<u>Sample No.</u>	<u>Sample Identification</u>
KATAHDIN	TTNUS
WP3417-1	31GLM0201
WP3417-2	29GLM0301
WP3417-3	31GLM0101D
WP3417-4	30GLM1201
WP3417-5	12GLM0401
WP3417-6	29TL00901
WP3417-7	31GLM0101
WP3417-8	29GLM0701

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

Sample analyses have been performed by the methods as noted herein.

Volatile Organic Analysis

Six aqueous samples were received by the Katahdin Analytical Services, Inc. GC/MS laboratory on July 28, 1999 and were specified to be analyzed by USEPA method 8260B for the analytes benzene, toluene, ethylbenzene, xylenes, MTBE, naphthalene, and EDB.

Analyses for this work order were performed on the 5972-S and 5970-Q instruments. A VSTD050 (50 ppb standard) was used for the continuing calibration standard. Internal standard and surrogate compounds were also spiked at 50 ug/l.

Batch QC (VBLK, and LCS) was performed in each twelve-hour window. Results are included in this data package. The LCS QC samples were spiked with the entire list of compounds quantitated for at 50 ppb. No matrix spike/matrix spike duplicate was performed on any of the samples in this work order.

Method 8000B, section 7.5.1.2.1 (Revision 2, 12/96) states, "in those instances where the RSD for one or more analytes exceeds 20%, the initial calibration curve may still be acceptable if the mean of the RSD values for all analytes in the calibration is less than or equal to 20%." Method 8260B narrows this 20% maximum to 15%.

In the calibration curves analyzed in this SDG, the average %RSD for all analytes was 13.7% and 15.0%, making the curves acceptable.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" (software-generated) on the pertinent quantitation reports. All "M" flags have been dated and initialed by the analyst performing the integration. In addition, all "M" flags have been reviewed and approved by the GC/MS supervisor. Copies of each manual integration are included in the pertinent quantitation reports.

No other protocol deviations were noted by the volatile organics staff.

Semivolatile Organic Analysis

Six aqueous samples were received by Katahdin Analytical Services laboratory on July 28, 1999 for analysis in accordance with 8270C for a client specified PAH list of analytes.

Extraction of the samples occurred following USEPA method 3510 on July 29, 1999. A laboratory control spike, consisting of all PAH analytes spiked into organic free water, was extracted in the batch, along with a site specific MS/MSD pair on sample WP3417-8.

The initial calibration curve analyzed in this SDG had some of the target analyte %RSD values exceeding 15 %.

Method 8000B, section 7.5.1.2.1 (Revision 2, 12/96) states, "in those instances where the RSD for one or more analytes exceeds 20%, the initial calibration curve may still be acceptable if the mean of the RSD values for all analytes in the calibration is less than or equal to 20%." Section 7.3.7.1 of method 8270C (revision 3, 12/96) narrows this 20% maximum to 15%.

In the calibration curve analyzed in this SDG, the average %RSD for all analytes was 10.1%, making the curve acceptable.

Initial analysis of sample WP3417-3 yielded a low recovery of the surrogate 2-fluorobiphenyl. Reanalysis yielded two low base-neutral surrogate recoveries. Both sets of data for this sample are included in the data package.

Initial analysis of sample WP3417-8 yielded internal standard area recovery deviations. Reanalysis yielded similar results, confirming matrix interference. Both sets of data are included in this data package.

Analysis of the QC sample WP3417-8MS yielded a low recovery of the surrogate terphenyl-d14.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" by the data system. All manual integrations have been dated and initialed by the responsible analyst. Copies of each manual integration are included in the data package. All manual integrations have been reviewed and approved by the GC/MS supervisor.

No other protocol deviations were noted by the semivolatiles organics staff.

Wet Chemistry Analysis

For work order WP3417 analyses for Nitrate (E300) and Sulfate (E300) were performed according to the U.S. EPA "Methods for the Determination of Inorganic Substances in Environmental Samples", EPA 600/R-93/100, August 1993. All samples were run within laboratory hold time. The wet chemistry staff noted no protocol deviations.

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
Tel. (207) 874-2400
Fax (207) 775-4029

LAB (WORK ORDER) # WP 3417

PAGE: 1 OF 2

COOLER: 1 OF 2

CLIENT: Tetra Tech

COC# =

SDG# =

DATE / TIME RECEIVED: 7-28-99 0905

DELIVERED BY: Fed Ex

RECEIVED BY: Sam

LIMS ENTRY BY: SAW

LIMS REVIEW BY / PM: ALC

PROJECT: CNC

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>COC not signed by sampler</u>	
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>1.2</u>	<u>ALC notified Daniel Calogian by fax 7/28/99</u>
6. SAMPLES RECEIVED AT 4°C +/- 2° <u>(ICE)</u> ICE PACKS PRESENT <u>(Y)</u> or <u>(N)</u> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u> (RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>NA</u>		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE * OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:

Sample I.D.s : • 31 GLM Ø1Ø1
• 29 GLM Ø7Ø1
• 29 GLM Ø7Ø1 M (MSMSD)

} VOA VIALS
} NOT RECEIVED

→ CLIENT NOTIFIED PROJ. MNGR. ~ LOG-IN NOTIFIED PROJ. MNGR UPON RECEIPT.

⁽¹⁾ Use this sheet (and additional sheets if necessary) to document samples that are received broken, check if required. If samples required pH adjustment, record volume and type of preservative added.

compromised, C-O-C discrepancies, radiation checks, residual chlorine check, recheck pH

KATAH ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
Tel. (207) 874-2400
Fax (207) 775-4029

LAB (WORK ORDER) # WP3417

PAGE: 2 OF 2

COOLER: 2 OF 2

COC# —

SDG# —

DATE / TIME RECEIVED: 7-28-99 0905

DELIVERED BY: FedEx

RECEIVED BY: San

LIMS ENTRY BY: SAW

LIMS REVIEW BY / PM: KCL

CLIENT: TetraTech

PROJECT: CNC

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>0.8</u>	<u>ASC notified Van Callica by fax 7/23/99</u>
6. SAMPLES RECEIVED AT 4°C ± 2° (ICE) ICE PACKS PRESENT (Y or N)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u> (RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative added.

0000038



340 County Road No. 5
P.O. Box 720
Westbrook, ME 04098
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE PRINT IN PEN

Page ____ of ____

Client Tetra Tech NUS Inc Contact _____ Phone # (843) 814 9080 Fax # _____

Address NH 21 Ave H City N. Charleston State S.C. Zip Code 29405

Purchase Order # _____ Proj. Name / No. _____ Katahdin Quote # _____

Bill (if different than above) _____ Address _____

Sampler (Print / Sign) _____ Copies To: _____

LAB USE ONLY WORK ORDER #: WP 3417 KATAHDIN PROJECT MANAGER _____

REMARKS: _____

SHIPPING INFO: ☐ FED EX ☐ UPS ☐ CLIENT

AIRBILL NO: _____

TEMP °C _____ ☐ TEMP BLANK ☐ INTACT ☐ NOT INTACT

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	ANALYSIS AND CONTAINER TYPE PRESERVATIVES									
					Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON
	31GLMØ1Ø1	7/27/99/1055	GW	9	3	3	2	1						
	31GLMØ2Ø1	1/1055		9	3	3	2	1						
	31GLMØ1Ø1D	1/1055		5	3		2							
	29GLMØ3Ø1	1/1010		5	3	3	2	1						
	29GLMØ7Ø1	1/1245		5	3		2							
	29GLMØ7Ø1M	1/1245		5	3		2							
	29GLMØ4Ø1	7/24/99/1605		3	3									
	3ØGLM12Ø1	7/27/99/1721		5	3		2							
	29TLØØ9Ø1	7/27/99/0720		3	3									
	/	/												
	/	/												
	/	/												
	/	/												
	/	/												
	/	/												
	/	/												
	/	/												

COMMENTS Sample #29GLMØ7Ø1M is an MS/MSD

Relinquished By: (Signature) <u>[Signature]</u>	Date / Time <u>7/29/99</u>	Received By: (Signature) <u>813402904543</u>	Relinquished By: (Signature) _____	Date / Time <u>7/28/99 0905</u>	Received By: (Signature) <u>[Signature]</u>
Relinquished By: (Signature) _____	Date / Time _____	Received By: (Signature) _____	Relinquished By: (Signature) _____	Date / Time _____	Received By: (Signature) _____

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 1

ORDER NO WP-3417

Project Manager: Andrea J. Colby

REPORT TO: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 07/28/99

PHONE: 850/385-9899

FAX: 850/385-9860

DUE: 27 AUG

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
FOSTER PLAZA 7, 661 ANDERSEN DR.
PITTSBURGH, PA 15220

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: CLIENT

DELIVERED BY: FEDEX

DISPOSE: AFTER 27 AUG

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WP3417-1	31GLM0201	27 JUL 1050	28 JUL	AQ
	WP3417-2	29GLM0301	27 JUL 1010		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	2	75.00	150.00
GC Subcontract		2	95.00	190.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	2	125.00	250.00
Nitrogen, Nitrate (as N)	E300	2	30.00	60.00
Sulfate (as SO4)	E300	2	0.00	0.00
TOTALS		2	325.00	650.00

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2 WP3417-3	31GLM0101D	27 JUL 1055	28 JUL	AQ
WP3417-4	30GLM1201	27 JUL 1721		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	2	75.00	150.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	2	125.00	250.00
TOTALS		2	200.00	400.00

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
3 WP3417-5	12GLM0401	24 JUL 1605	28 JUL	AQ
WP3417-6	29TL00901	27 JUL 0730		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	2	75.00	150.00

LABORATORY ORDER CONTINUED ON PAGE 2

99009/01/01

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 2

ORDER NO WP-3417

Project Manager: Andrea J. Colby

REPORT TO: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 07/28/99

PHONE: 850/385-9860

FAX: 850/385-9860

DUE: 27 AUG

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
FOSTER PLAZA 7, 661 ANDERSEN DR.
PITTSBURGH, PA 15220

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: CLIENT

DELIVERED BY: FEDEX

DISPOSE: AFTER 27 AUG

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
4	WP3417-7	31GLM0101	27 JUL 1055	28 JUL	AQ

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
GC Subcontract		1	95.00	95.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	125.00	125.00
Nitrogen, Nitrate (as N)	E300	1	30.00	30.00
Sulfate (as SO4)	E300	1	0.00	0.00

TOTALS		1	250.00	250.00
--------	--	---	--------	--------

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
5	WP3417-8	29GLM0701	27 JUL 1245	28 JUL	AQ

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	125.00	125.00

ORDER NOTE: QC-IV NFESC
DD(KAS007QC-DB3)
CNC CHARLESTON

REPORT COPY: MS LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.
PITTSBURG, PA 15220

INVOICE: With Report

TOTAL ORDER AMOUNT \$1,575.00

This is NOT an Invoice

AJC/BKR

07-28 Please contact KATAHDIN ANALYTICAL SERVICES promptly if you have any questions

90009941
07/28/99



KATAHDIN ANALYTICAL SERVICES

Summary of Report Notes

Report Note	Note Text
#	# flag denotes surrogate compound recovery is out of criteria.
O-13	Internal standard area(s) are out of criteria. Reanalysis confirmed matrix interference.

CLIENT: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-3417-2
Report Date: 08/31/99
PO No. : N7912-P99264
Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 2 of 3

SAMPLE DESCRIPTION	MATRIX			SAMPLED BY		SAMPLED DATE RECEIVED		
29GLM0301	Aqueous			CLIENT		07/27/99	07/28/99	
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED	BY	NOTES
Nitrogen, Nitrate (as N)	0.066	mg/L	1.0	0.050	E300	07/28/99	CF	
Sulfate (as SO4)	8.6	mg/L	1.0	1.0	E300	08/14/99	CF	

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

08/31/99

LJO/baeajc(dw)/msm
PG28N3W1

CC: MS LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3417-2
SDG: WP3417
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/11/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0301	AQ	7/27/99	7/28/99	7/29/99	DPD	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	61	%	1.0		
2-FLUOROBIPHENYL	63	%	1.0		
TERPHENYL-D14	75	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3417-2
SDG: WP3417
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 7/31/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0301	AQ	7/27/99	7/28/99	7/31/99	HMP	5030	HMP

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	94	%	1.0		
1,2-DICHLOROETHANE-D4	95	%	1.0		
TOLUENE-D8	90	%	1.0		
P-BROMOFLUOROBENZENE	92	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP3417-6
SDG: WP3417
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/3/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29TL00901	AQ	7/27/99	7/28/99	8/3/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	113	%	1.0		
1,2-DICHLOROETHANE-D4	116	%	1.0		
1,2-DICHLOROETHANE-D8	112	%	1.0		
P-BROMOFLUOROBENZENE	91	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP3417-8
SDG: WP3417
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/10/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0701	AQ	7/27/99	7/28/99	7/29/99	DPD	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	50	%	1.0		
2-FLUOROBIPHENYL	52	%	1.0		
TERPHENYL-D14	50	%	1.0		

Report Notes: O-13



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3417-8RA
SDG: WP3417
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/11/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0701	AQ	7/27/99	7/28/99	7/29/99	DPD	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
RYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	57	%	1.0		
2-FLUOROBIPHENYL	57	%	1.0		
TERPHENYL-D14	53	%	1.0		

Port Notes: O-13

Karabin Analytical Services, Inc.

Quality Control Report

Method Blank and Laboratory Control Sample Results

Client: Tetra Tech NUS

Work Order: WP3417

METHOD BLANK RESULTS								LABORATORY CONTROL SAMPLE RESULTS				
Parameter	Date of Prep	Date of Analysis	Units	Concentration Measured in Blank	Acceptance Range	Practical Quantitation Level**	Units	True Value	Measured Value	Percent Recovered	Acceptance Range (%)	Acceptance Range (mg/kg)
Nitrate-Nitrogen	28-Jul-99	28-Jul-99	mg/L	< 0.050	< 0.050	0.050	mg/L	2.5	2.47	98.8	80-120	
Sulfate	14-Aug-99	14-Aug-99	mg/L	< 1.0	< 1.0	1.0	mg/L	10	10.2	102.0	80-120	

** Practical quantitation level is the lowest concentration measurable for samples with normal chemical and physical composition during routine laboratory operations.

DATA QUALITY COMMENTS:

Results of all quality control measurements are within the laboratory and method specified acceptance range except as noted.

4B
SEMIVOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

SBLK;072999

Lab Name: Katahdin Analytical Services

SDG No.: WP3417

Lab File ID: Z1692

Lab Sample ID: SBLK;072999

Instrument ID: 5972-Z

Date Extracted: 7/29/99

GC Column: RTX-624 ID: 0.18 (mm)

Date Analyzed: 08/10/99

Matrix: (soil/water) WATER

Time Analyzed: 12:49

Level: (low/med) LOW

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCS;072999	LCS;072999	Z1693	8/10/99	1:34:00 PM
31GLM0201	WP3417-1	Z1694	8/10/99	2:20:00 PM
31GLM0101D	WP3417-3	Z1696	8/10/99	3:51:00 PM
30GLM1201	WP3417-4	Z1697	8/10/99	4:37:00 PM
31GLM0101	WP3417-7	Z1698	8/10/99	5:23:00 PM
29GLM0701	WP3417-8	Z1699	8/10/99	6:09:00 PM
29GLM0701MSD	WP3417-8MSD	Z1701	8/10/99	7:41:00 PM
29GLM0301	WP3417-2	Z1707	8/11/99	12:28:00 PM
31GLM0101D	WP3417-3RA	Z1708	8/11/99	1:14:00 PM
29GLM0701	WP3417-8RA	Z1709	8/11/99	2:00:00 PM
29GLM0701MS	WP3417-8MS	Z1710	8/11/99	2:45:00 PM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: SBLK072999
SDG: WP3417
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/10/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
SBLK072999	AQ	-	-	7/29/99	DPD	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	60	%	1.0		
2-FLUOROBIPHENYL	61	%	1.0		
TERPHENYL-D14	96	%	1.0		

Report Notes:

Katahdin Analytical Services

8270 LCS Recovery Sheet

Lab File: Z1693

Sample ID: LCS;072999

Date Run: 8/10/99

Analyst: KRT

Time Injected 1:34:00 PM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
2-METHYLNAPHTHALENE	50	34.8	*70	70-130
ACENAPHTHENE	50	36.8	74	70-130
ACENAPHTHYLENE	50	37.2	74	70-130
ANTHRACENE	50	45.3	90	70-130
BENZO[A]ANTHRACENE	50	42.2	84	70-130
BENZO[A]PYRENE	50	35.9	72	70-130
BENZO[B]FLUORANTHENE	50	34.4	*69	70-130
BENZO[G,H,I]PERYLENE	50	35.7	71	70-130
BENZO[K]FLUORANTHENE	50	40.4	81	70-130
CHRYSENE	50	43.4	87	70-130
DIBENZ[A,H]ANTHRACENE	50	32.8	*66	70-130
FLUORANTHENE	50	41.7	83	70-130
FLUORENE	50	37.0	74	70-130
INDENO[1,2,3-CD]PYRENE	50	35.0	70	70-130
NAPHTHALENE	50	34.6	*69	70-130
PHENANTHRENE	50	42.4	85	70-130
PYRENE	50	48.6	97	70-130

* Out of Limits

1

0000026

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
WP3417-8	Z1699	8/10/99	6:09:00 PM	KRT	AQ	8270_99
WP3417-8MS	Z1710	8/11/99	2:45:00 PM	KRT	AQ	8270_99
WP3417-8MSD	Z1701	8/10/99	7:41:00 PM	KRT	AQ	8270_99

Compound Name	Native (ug/L)	MS Spk Amount (ug/L)	MSD Spk Amount (ug/L)	MS Result (ug/L)	MSD Result (ug/L)	MS REC (%)	MSD REC (%)	Recovery Limits (%)	RPD (%)	RPD Limit (%)
CHRYSENE	0	49	48	24.0	39.7	*49	83	60-140	*49	30
ACENAPHTHENE	0	49	48	29.3	35.3	60	73	60-140	18	30
ACENAPHTHYLENE	0	49	48	30.2	35.2	62	73	60-140	15	30
ANTHRACENE	0	49	48	30.9	42.0	63	88	60-140	30	30
BENZO[A]ANTHRACENE	0	49	48	22.8	38.0	*46	79	60-140	*50	30
BENZO[A]PYRENE	0	49	48	18.2	32.0	*37	67	60-140	*55	30
BENZO[B]FLUORANTHENE	0	49	48	16.6	29.5	*34	62	60-140	*56	30
2-METHYLNAPHTHALENE	0	49	48	28.2	33.2	*58	69	60-140	16	30
BENZO[K]FLUORANTHENE	0	49	48	23.0	38.8	*47	81	60-140	*51	30
PYRENE	0	49	48	30.4	45.0	62	94	60-140	*39	30
DIBENZ[A,H]ANTHRACENE	0	49	48	16.7	28.8	*34	60	60-140	*53	30
FLUORANTHENE	0	49	48	24.6	37.8	*50	79	60-140	*42	30
FLUORENE	0	49	48	27.8	34.1	*57	71	60-140	20	30
INDENO[1,2,3-CD]PYRENE	0	49	48	16.3	29.9	*33	62	60-140	*59	30
NAPHTHALENE	0	49	48	29.5	32.6	60	68	60-140	10	30
PHENANTHRENE	0	49	48	29.4	38.8	60	81	60-140	28	30
BENZO[G,H,I]PERYLENE	0	49	48	17.6	31.8	*36	66	60-140	*57	30

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBKQ31A

Lab Name: Katahdin Analytical Services

SDG No.: WP3417

Lab File ID: Q6100

Lab Sample ID: VBKQ31A

Date Analyzed: 07/31/99

Time Analyzed: 11:36

GC Column: RTX-502 ID: 0.53 (mm)

Heated Purge: (Y/N) N

Instrument ID: 5970-Q

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCSQ31A	LCSQ31A	Q6099	7/31/99	10:44:00 AM
31GLM0201	WP3417-1	Q6113	7/31/99	8:23:00 PM
29GLM0301	WP3417-2	Q6114	7/31/99	9:02:00 PM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKQ31A
SDG: WP3417
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 7/31/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKQ31A	AQ	-	-	7/31/99	HMP	5030	HMP

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	95	%	1.0		
1,2-DICHLOROETHANE-D4	93	%	1.0		
TOLUENE-D8	96	%	1.0		
P-BROMOFLUOROBENZENE	95	%	1.0		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Q6099

Sample ID: LCSQ31A

Date Run: 7/31/99

Analyst: HMP

Time Injected 10:44:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	48.2	96	60-140
BENZENE	50	47.9	96	60-140
ETHYLBENZENE	50	50.1	100	60-140
MTBE	50	50.8	102	60-140
NAPHTHALENE	50	45.5	91	60-140
TOLUENE	50	49.3	98	60-140
TOTAL XYLENES	150	137	91	60-140

* Out of Limits

1

0000034

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBKKS02B

Lab Name: Katahdin Analytical Services

SDG No.: WP3417

Lab File ID: S5790

Lab Sample ID: VBKKS02B

Date Analyzed: 08/02/99

Time Analyzed: 23:51

GC Column: RTX-624 ID: 0.18 (mm)

Heated Purge: (Y/N) N

Instrument ID: 5972-S

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCSS02B	LCSS02B	S5788	8/2/99	10:36:00 PM
12GLM0401	WP3417-5	S5791	8/3/99	12:29:00 AM
29TL00901	WP3417-6	S5792	8/3/99	1:06:00 AM

0000032



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKS02B
SDG: WP3417
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/2/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKS02B	AQ	-	-	8/2/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	111	%	1.0		
1,2-DICHLOROETHANE-D4	112	%	1.0		
TOLUENE-D8	111	%	1.0		
BROMOFLUOROBENZENE	92	%	1.0		

Port Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: S5788

Sample ID: LCSS02B

Date Run: 8/2/99

Analyst: KMC

Time Injected 10:36:00 PM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	49.9	100	60-140
BENZENE	50	53.1	106	60-140
ETHYLBENZENE	50	64.8	130	60-140
MTBE	50	53.2	106	60-140
NAPHTHALENE	50	61.4	123	60-140
TOLUENE	50	56.1	112	60-140
TOTAL XYLENES	150	196	131	60-140

* Out of Limits

1

0000036

ENSR
Air Toxics Specialty Laboratory
42 Nagog Park
Acton, MA 01720

DATE: August 26, 1999

TO: Andrea Colby
Katahdin Analytical
340 County Road No. 5
P.O. Box 720
Westbrook, ME 04098

Re: Organic Analyses of Aqueous Samples by Gas Chromatography Flame
Ionization Detection (GC/FID)

PROJECT #: **8601-008-200**

LAB ID #: **990123**

ANALYTICAL PROCEDURE:

Three (3) aqueous samples were analyzed under the guidelines of EPA SW846 Method 3810.

A Hewlett Packard 5890 series II gas chromatograph (GC) equipped with a Hewlett Packard flame ionization detector (FID) was used for the analysis. A 1.0 mL headspace aliquot of each sample was injected into the column for analysis. The operating conditions of the GC/FID are listed in Table 1. A five point calibration was performed for the target analytes (methane, ethane, and ethylene).

No problems occurred during sample receipt or log-in.

QUALITY CONTROL:

1. A laboratory blank was analyzed daily in the same manner as the samples. Target analytes were not detected in the blank.
2. A Matrix Spike/MSD was performed on the following sample:
WP3417-7

All recoveries were within QC limits.

Date Samples Received by the Laboratory: 7/28/99

Date Analysis Started: 8/4/99

C:\My Documents\katrpt10.doc

SAMPLE LOG-IN & RECEIPT CHECKLIST

Client/Proj #: Katahdin WP 3417 / 8601-008-200

Proj Mgr: M. Hoyt

Lab Pool #: 990123

Inspected & Logged in by: A MacDuff

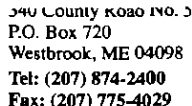
Date Time: 7/29/99 1015

Sample Matrix	Number of Samples	Analysis Requested	Analyze by (date)	Storage Location
Aqueous	3	mee	8/25/99	R1

Circle the appropriate response:

- 1) ☒ Shipped ☐ Hand delivered
- 2) COC ☒ present / ☐ not present on receipt
- 3) COC Tape ☒ present / ☐ not present on shipping container
- 4) Samples broken / ☒ intact on receipt
- 5) Samples ambient / ☒ chilled on receipt Temp blank = 5°C
- 6) Samples preserved ☒ correctly / ☐ incorrectly / none recommended
- 7) Received ☒ within / ☐ outside holding time
- 8) COC tapes present / not present on samples
- 9) Discrepancies / NO discrepancies noted between COCs and samples

Additional Comments: 3 Vortz per sample
Andrea Colby



7942

Page of

Address 1000 1st Ave City San Francisco State CA Zip Code 94101

Purchase Order #	Proj. Name / No.	Katahdin Quote #
------------------	------------------	------------------

Bill (if different than above)	Address
---------------------------------------	----------------

Sampler (Print / Sign)	Copies To:
------------------------	------------

LAB USE ONLY	WORK ORDER #:	_____ *	ANALYSIS AND CONTAINER TYPE PRESERVATIVES

[illegible]

REMARKS: SUB. TO ENSR

SHIPPING INFO:					
<input checked="" type="checkbox"/>	FED EX	<input type="checkbox"/>	UPS	<input type="checkbox"/>	CLIENT

[illegible]

TEMP°C ☒ TEMP BLANK ☐ INTACT ☐ NOT INTACT 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

[illegible]

COMMENTS
QC-IV NFESC DD (KAS007QC-DB3) Results Due: 8-25-99

Relinquished By: (Signature) <i>[Signature]</i>	Date / Time 7-28-99 1445	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
					7/30/99 1015

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

WP3417-2(H)

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: 990123-2

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ KTH_029 _____

Level: (low/med) _____ low _____

Date Received: _____ 7/29/99 _____

% Moisture: _____ NA _____

Date Analyzed: _____ 8/4/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (µl)

Soil Aliquot Volume: _____ NA _____ (µl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(µg/L or PPMv) _____ µg/L _____

Q

74-82-8

Methane

5.2

U

74-85-1

Ethene

9.0

U

74-84-0

Ethane

9.6

U

4
METHOD BLANK SUMMARY

EPA SAMPLE NO.

Lab Name: ENSR Contract:

VBK01

Lab Code: Case No.: SAS NO.: SDG NO.:

Lab File ID: KTH_026

Lab Sample I MB990123

Instrument ID: HPGC#3

Date Analyzed: 8/4/99

Matrix: (soil/water) water

Level: (low/med) low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES; MS AND MSD

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
01	LCS01	LCS990123	KTH_027	08/04/99
02	WP3417-1(H)	990123-1	KTH_028	08/04/99
03	WP3417-2(H)	990123-2	KTH_029	08/04/99
04	WP3417-7(C)	990123-3	KTH_030	08/04/99
05	WP3417-7(A) MS	990123-3 MS	KTH_031	08/04/99
06	WP3417-7(B) MSD	990123-3 MSD	KTH_032	08/04/99
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

COMMENTS:

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. _____

Lab Name: _____ ENSR _____ Contract: _____

VBLK01

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: MB990123

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ KTH_026 _____

Level: (low/med) _____ low _____

Date Received: _____ NA _____

% Moisture: _____ NA _____

Date Analyzed: _____ 8/4/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (μl)

Soil Aliquot Volume: _____ NA _____ (μl)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (μg/L or PPMv) _____ μg/L _____	Q
---------	----------	---	---

74-82-8	Methane	5.2	U
74-85-1	Ethene	9.0	U
74-84-0	Ethane	9.6	U

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. _____

Lab Name: _____ ENSR _____ Contract: _____

LCS01

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: LCS990123

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ KTH_027 _____

Level: (low/med) _____ low _____

Date Received: _____ NA _____

% Moisture: _____ NA _____

Date Analyzed: _____ 8/4/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (µl)

Soil Aliquot Volume: _____ NA _____ (µl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(µg/L or PPMv) _____ µg/L _____

Q

74-82-8	Methane	38	
74-85-1	Ethene	66	
74-84-0	Ethane	70	

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. _____

Lab Name: _____ ENSR _____ Contract: _____

WP3417-7(A)MS

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: 990123-3 MS

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ KTH_031 _____

Level: (low/med) _____ low _____

Date Received: _____ 7/29/99 _____

% Moisture: _____ NA _____

Date Analyzed: _____ 8/4/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (µl)

Soil Aliquot Volume: _____ NA _____ (µl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:

(µg/L or PPMv) _____ µg/L _____

Q

74-82-8	Methane	370	
74-85-1	Ethene	620	
74-84-0	Ethane	690	

ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. _____

Lab Name: _____ ENSR _____ Contract: _____

WP3417-7(B) MSD

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: 990123-3 MSD

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: ___KTH_032_____

Level: (low/med) _____ low _____

Date Received: ___7/29/99_____

% Moisture: _____ NA _____

Date Analyzed: ___8/4/99_____

GC Column: _ Carboxen 1004 _ OD: ___ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (µl)

Soil Aliquot Volume: _____ NA _____ (µl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(µg/L or PPMv) ___ µg/L ___

Q

74-82-8	Methane	280	
74-85-1	Ethene	480	
74-84-0	Ethane	530	

LABORATORY CONTROL SPIKE RECOVERY

Lab Name: _____ ENSR _____ Contract: _____

Lab Code: _____ Case NO.: _____ SAS NO.: _____ SDG NO.: _____

Laboratory Control Sample No: _____ LCS01 _____

COMPOUND	SPIKE ADDED (µg/L)	LCS CONCENTRATION (µg/L)	LCS % REC #	QC LIMITS REC.
Methane	41.03	38.28	93%	50 - 150
Ethene	71.04	65.55	92%	50 - 150
Ethane	77.69	70.18	90%	50 - 150

* - Values outside of QC limits.

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ____ ENSR _____ Contract: _____

Lab Code: _____ Case NO.: _____ SAS NO.: _____ SDG NO.: _____

Matrix Spike - EPA Sample NO.: __WP3417-7 _____

COMPOUND	SPIKE ADDED (µg/L)	SAMPLE CONCENTRATION (µg/L)	MS CONCENTRATION (µg/L)	MS % REC #	QC LIMITS REC.
Methane	410.3	0	371.8	91%	50-150
Ethene	710.4	0	624.4	88%	50-150
Ethane	777.0	0	689.1	89%	50-150

COMPOUND	SPIKE ADDED (µg/L)	MSD CONCENTRATION (µg/L)	MSD % REC #	% RPD #	QC LIMITS RPD	REC.
Methane	410.3	283.9	69%	27%	50	50-150
Ethene	710.4	484.5	68%	25%	50	50-150
Ethane	777.0	530.4	68%	26%	50	50-150

Spike recovery: ____ 0 ____ out of ____ 6 ____ outside limits.

RPD: ____ 0 ____ out of ____ 3 ____ outside limits.

Comments:



August 31, 1999

Mr. Paul Calligan

Tetra Tech Nus

1401 Oven Park Dr., Suite 102

Tallahassee, FL 32308

RE: Katahdin Lab Number: WP3429
Project ID: CNC Charleston
Project Manager: Ms. Andrea J. Colby
Sample Receipt Date(s): 7/29/99

Dear Mr. Calligan:

Please find enclosed the following information:

- * Report of Analysis
- * Quality Control Data Summary
- * Chain of Custody
- * Confirmation

Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact the project manager listed above. This cover letter is an integral part of the ROA.

We appreciate your continued use of our laboratory and look forward to working with you in the future. The following signature indicates technical review and acceptance of the data.

Sincerely,

KATAHDIN ANALYTICAL SERVICES

Mary S. Mouiel
Authorized Signature

8.31.99
Date

SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
TETRA TECH NUS
CASE CNC CHARLESTON

Sample Receipt

The following samples were received on July 29, 1999 and were logged in under Katahdin Analytical Services work order number WP3429 for a hardcopy due date of August 28, 1999.

KATAHDIN Sample No.	TTNUS Sample Identification
WP3429-1	31GLM0101
WP3429-2	29GLM0701
WP3429-3	31TL01001
WP3429-4	31GLM0301
WP3429-5	31GLM0401
WP3429-6	31GLM0501

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

Sample analyses have been performed by the methods as noted herein.

Volatile Organic Analysis

Six aqueous samples were received by the Katahdin Analytical Services, Inc. GC/MS laboratory on July 29, 1999 and were specified to be analyzed by USEPA method 8260B for the analytes benzene, toluene, ethylbenzene, xylenes, MTBE, naphthalene, and EDB.

Analyses for this work order were performed on the 5972-M instrument. A VSTD050 (50 ppb standard) was used for the continuing calibration standard. Internal standard and surrogate compounds were also spiked at 50 ug/l.

Batch QC (VBLK, and LCS) was performed in each twelve-hour window. Results are included in this data package. The LCS QC samples were spiked with the entire list of compounds quantitated for at 50 ppb. A matrix spike/matrix spike duplicate was performed on sample WP3429-5.

Method 8000B, section 7.5.1.2.1 (Revision 2, 12/96) states, "in those instances where the RSD for one or more analytes exceeds 20%, the initial calibration curve may still be acceptable if the mean of the RSD values for all analytes in the calibration is less than or equal to 20%." Method 8260B narrows this 20% maximum to 15%.

In the calibration curves analyzed in this SDG, the average %RSD for all analytes was 11.3%,



making the curve acceptable.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" (software-generated) on the pertinent quantitation reports. All "M" flags have been dated and initialed by the analyst performing the integration. In addition, all "M" flags have been reviewed and approved by the GC/MS supervisor. Copies of each manual integration are included in the pertinent quantitation reports.

No other protocol deviations were noted by the volatile organics staff.

Semivolatile Organic Analysis

Three aqueous samples were received by Katahdin Analytical Services laboratory on July 29, 1999 for analysis in accordance with 8270C for a client specified PAH list of analytes.

Extraction of the samples occurred following USEPA method 3510 on July 30, 1999. A laboratory control spike, consisting of all PAH analytes spiked into organic free water, was extracted in the batch, along with a site specific MS/MSD pair on sample WP3429-5.

The initial calibration curve analyzed in this SDG had some of the target analyte %RSD values exceeding 15 %.

Method 8000B, section 7.5.1.2.1 (Revision 2, 12/96) states, "in those instances where the RSD for one or more analytes exceeds 20%, the initial calibration curve may still be acceptable if the mean of the RSD values for all analytes in the calibration is less than or equal to 20%." Section 7.3.7.1 of method 8270C (revision 3, 12/96) narrows this 20% maximum to 15%.

In the calibration curve analyzed in this SDG, the average %RSD for all analytes was 10.1%, making the curve acceptable.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" by the data system. All manual integrations have been dated and initialed by the responsible analyst. Copies of each manual integration are included in the data package. All manual integrations have been reviewed and approved by the GC/MS supervisor.

No other protocol deviations were noted by the semivolatiles organics staff.

Wet Chemistry Analysis

For work order WP3429 analyses for Nitrate (E300) and Sulfate (E300) were performed according to the U.S. EPA "Methods for the Determination of Inorganic Substances in Environmental Samples", EPA 600/R-93/100, August 1993. All samples were run within laboratory hold time. The wet chemistry staff noted no protocol deviations.

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
Tel. (207) 874-2400
Fax (207) 775-4029

LAB (WORK ORDER) # WP 3429

PAGE: 1 OF 1

COOLER: 1 OF 1

COC# ---

SDG# ---

DATE / TIME RECEIVED: 7-29-99 0900

DELIVERED BY: Fed Ex

RECEIVED BY: Sam

LIMS ENTRY BY: Sam

LIMS REVIEW BY / PM: ABC

CLIENT: Tetra Tech

PROJECT: CNC

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>1.0</u>	<u>ATC notified about calligan by fax 7/29/99</u>
6. SAMPLES RECEIVED AT 4°C +/- 2° <u>ICE</u> ICE PACKS PRESENT <u>Y</u> or N?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u> (RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this sheet (and additional sheets if necessary) to document samples that are received broken, compromised, C-O-C discrepancies, radiation checks, residual chlorine check, res Y pH check if required. If samples required pH adjustment, record volume and type of preservative added.

0000024



340 County Road No. 5
P.O. Box 720
Westbrook, ME 04098
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE PRINT IN PEN

Page ____ of ____

Client: Tetra Tech NUS Inc Contact: Rachel Galligan Phone #: (843) 557-4925 Fax #: ()
Address: NH-21 Ave H City: N. Charleston State: S.C. Zip Code: 29405-2106
Purchase Order #: _____ Proj. Name / No.: _____ Katahdin Quote #: _____

Bill (if different than above) Address: _____

Sampler (Print / Sign): James R. Hill / James R. Hill Copies To: _____

LAB USE ONLY WORK ORDER #: WP3429 KATAHDIN PROJECT MANAGER: _____
ANALYSIS AND CONTAINER TYPE PRESERVATIVES

REMARKS: _____

SHIPPING INFO: ☐ FED EX ☐ UPS ☐ CLIENT

AIRBILL NO.: _____

TEMP °C: ☐ TEMP BLANK ☐ INTACT ☐ NOT INTACT

* Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON	Filt. OYON
31GLMØ1Ø1	2/27/99/1055	GW	3	3										
29GLMØ7Ø1	1/1245		3	3										
29GLMØ7Ø1M	1/1245		3	3										
31GLMØ3Ø1	2/28/99/1040		9	3	2	3	1							
31GLMØ4Ø1	1/1115		5	3	2									
31GLMØ4Ø1M	1/1115		5	3	2									
31GLMØ5Ø1	1/1200		5	3	2									
31TLØ1ØØ1	1/6800		2	2										
	/													
	/													
	/													
	/													
	/													
	/													
	/													
	/													
	/													
	/													

COMMENTS: _____

Issued By: (Signature) <u>James R. Hill</u>	Date / Time <u>2/27/99 1500</u>	Received By: (Signature) <u>Shelley Wilkerson</u>	Relinquished By: (Signature) _____	Date / Time <u>7/29/99 0900</u>	Received By: (Signature) _____
Relinquished By: (Signature) _____	Date / Time _____	Received By: (Signature) _____	Relinquished By: (Signature) _____	Date / Time _____	Received By: (Signature) _____

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 1

ORDER NO WP-3429

Project Manager: Andrea J. Colby

REPORT TO: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 07/29/90

PHONE: 850/385-989

FAX: 850/385-9860

DUE: 28 AUG

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
FOSTER PLAZA 7, 661 ANDERSEN DR.
PITTSBURGH, PA 15220

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: J.R. HILL

DELIVERED BY: FEDEX

DISPOSE: AFTER 27 SEP

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WP3429-1	31GLM0101	27 JUL 1055	29 JUL	AQ
	WP3429-2	29GLM0701	27 JUL 1245		
	WP3429-3	31TL01001	28 JUL 0800		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	3	75.00	225.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2	WP3429-4	31GLM0301	28 JUL 1040	29 JUL	AQ

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	1	75.00	75.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	125.00	125.00
GC Subcontract		1	95.00	95.00
Sulfate (as SO4)	E300	1	30.00	30.00
Nitrogen, Nitrate (as N)	E300	1	0.00	0.00

TOTALS		1	325.00	325.00
--------	--	---	--------	--------

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
3	WP3429-5	31GLM0401	28 JUL 1115	29 JUL	AQ
	WP3429-6	31GLM0501	28 JUL 1200		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	2	75.00	150.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	2	125.00	250.00

TOTALS		2	200.00	400.00
--------	--	---	--------	--------

LABORATORY ORDER CONTINUED ON PAGE 2

0000986/22

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 2

ORDER NO WP-3429

Project Manager: Andrea J. Colby

ORDER DATE: 07/29/99

REPORT TO: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

PHONE: 850/385-9899

FAX: 850/385-9860

DUE: 28 AUG

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
FOSTER PLAZA 7, 661 ANDERSEN DR.
PITTSBURGH, PA 15220

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: J.R. HILL

DELIVERED BY: FEDEX

DISPOSE: AFTER 27 SEP

ORDER NOTE: QC-IV NFESC
DD(KAS007QC-DB3)
CNC CHARLESTON
REPORT COPY: MS.LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.
PITTSBURGH, PA 15220
REPORT & DISK

INVOICE: With Report

TOTAL ORDER AMOUNT \$950.00

This is NOT an Invoice

AJC/BKR

07-29 Please contact KATAHDIN ANALYTICAL SERVICES promptly if you have any questi

000002700



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3429-2
SDG: WP3429
Report Date: 8/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/3/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0701	AQ	7/27/99	7/29/99	8/3/99	DJP	5030	DJP

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	100	%	1.0		
1,2-DICHLOROETHANE-D4	97	%	1.0		
TOLUENE-D8	102	%	1.0		
P-BROMOFLUOROBENZENE	98	%	1.0		

Report Notes:

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBCLKM02A

Lab Name: Katahdin Analytical Services

SDG No.: WP3429

Lab File ID: M1328

Lab Sample ID: VBCLKM02A

Date Analyzed: 08/03/99

Time Analyzed: 16:01

GC Column: RTX-624 ID: 0.18 (mm)

Heated Purge: (Y/N) N

Instrument ID: 5972-M

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCSM02A	LCSM02A	M1327	8/3/99	3:22:00 PM
31GLM0101	WP3429-1	M1333	8/3/99	7:14:00 PM
29GLM0701	WP3429-2	M1334	8/3/99	7:53:00 PM
31TL01001	WP3429-3	M1335	8/3/99	8:32:00 PM
31GLM0301	WP3429-4	M1336	8/3/99	9:12:00 PM
31GLM0401	WP3429-5	M1337	8/3/99	9:52:00 PM
31GLM0501	WP3429-6	M1338	8/3/99	10:30:00 PM
31GLM0401MS	WP3429-5MS	M1342	8/4/99	1:09:00 AM
31GLM0401MSD	WP3429-5MSD	M1343	8/4/99	1:47:00 AM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: VBLKM02A
SDG: WP3429
Report Date: 8/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/3/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKM02A	AQ	-	-	8/3/99	DJP	5030	DJP

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	98	%	1.0		
1,2-DICHLOROETHANE-D4	94	%	1.0		
TOLUENE-D8	101	%	1.0		
P-BROMOFLUOROBENZENE	99	%	1.0		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: M1327

Sample ID: LCSM02A

Date Run: 8/3/99

Analyst: DJP

Time Injected 3:22:00 PM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	49.6	99	60-140
BENZENE	50	51.8	104	60-140
ETHYLBENZENE	50	52.0	104	60-140
MTBE	50	48.7	97	60-140
NAPHTHALENE	50	48.8	98	60-140
TOLUENE	50	52.1	104	60-140
TOTAL XYLENES	150	153	102	60-140

*** Out of Limits**

1

0000022

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
WP3429-5	M1337	8/3/99	9:52:00 PM	DJP	AQ	8260_99
WP3429-5MS	M1342	8/4/99	1:09:00 AM	DJP	AQ	8260_99
WP3429-5MSD	M1343	8/4/99	1:47:00 AM	DJP	AQ	8260_99

Compound Name	Native (ug/L)	MS Spk Amount (ug/L)	MSD Spk Amount (ug/L)	MS Result (ug/L)	MSD Result (ug/L)	MS REC (%)	MSD REC (%)	Recovery Limits (%)	RPD (%)	RPD Limit (%)
TOTAL XYLENES	0	150	150	130	128	87	86	60-140	1.6	20
TOLUENE	0	50	50	44.6	44.2	89	88	60-140	0.90	20
NAPHTHALENE	0	50	50	35.8	37.3	72	74	60-140	4.1	20
MTBE	0	50	50	42.9	43.0	86	86	60-140	0.23	20
ETHYLBENZENE	0	50	50	44.1	43.0	88	86	60-140	2.5	20
BENZENE	0	50	50	44.3	44.0	88	88	60-140	0.68	20
1,2-DIBROMOETHANE	0	50	50	43.2	44.5	86	89	60-140	3.0	20

August 27, 1999

Mr. Paul Calligan
Tetra Tech Nus
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

RE: Katahdin Lab Number: WP3395
Project ID: CNC Charleston
Project Manager: Ms. Andrea J. Colby
Sample Receipt Date(s): 7/27/99

Dear Mr. Calligan:

Please find enclosed the following information:

- * Report of Analysis
- * Quality Control Data Summary
- * Chain of Custody
- * Confirmation

Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact the project manager listed above. This cover letter is an integral part of the ROA.

We appreciate your continued use of our laboratory and look forward to working with you in the future. The following signature indicates technical review and acceptance of the data.

Sincerely,

KATAHDIN ANALYTICAL SERVICES

Maria Crouch
Authorized Signature

08/27/99
Date

**SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
TETRA TECH NUS
CASE CNC CHARLESTON**

Sample Receipt

The following samples were received on July 27, 1999 and were logged in under Katahdin Analytical Services work order number WP3395 for a hardcopy due date of August 26, 1999.

<u>Sample No.</u>	<u>Sample Identification</u>
KATAHDIN	TTNUS
WP3395-1	12TL00801
WP3395-2	12GLM0401
WP3395-3	12GLM0401D
WP3395-4	12GLM0501
WP3395-5	12GLM0301
WP3395-6	12GLM0701
WP3395-7	13GLM0201
WP3395-8	13GLM0201D
WP3395-9	13GLM0401
WP3395-10	29GLM0201
WP3395-11	29GLM0401
WP3395-12	29GLM0401D
WP3395-13	29GLM0501
WP3395-14	ZBR00101
WP3395-15	12GLM0101
WP3395-16	12GLM0201
WP3395-17	12GLM0601

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

Sample analyses have been performed by the methods as noted herein.

Volatile Organics Analysis

Seventeen aqueous samples were received by the Katahdin Analytical Services, Inc. GC/MS laboratory on July 27, 1999 and were specified to be analyzed by USEPA method 8260B for the analytes benzene, toluene, ethylbenzene, xylenes, MTBE, naphthalene, and EDB.

Analyses for this workorder were performed on the 5972-M and 5973-U instruments. A VSTD050 (50 ppb standard) was used for the continuing calibration standard. Internal standard and surrogate compounds were also spiked at 50 ug/l.

Batch QC (VBLK, and LCS) was performed in each twelve-hour window. Results are included in this data package. The LCS QC samples were spiked with the entire list of compounds quantitated for at 50 ppb. No matrix spike/matrix spike duplicate was performed on any of the samples in this workorder.

Method 8000B, section 7.5.1.2.1 (Revision 2, 12/96) states, "in those instances where the RSD for one or more analytes exceeds 20%, the initial calibration curve may still be acceptable if the mean of the RSD values for all analytes in the calibration is less than or equal to 20%." Method 8260B narrows this 20% maximum to 15%.

In the calibration curves analyzed in this SDG, the average %RSD for all analytes was 10.4% and 15.0%, making the curves acceptable.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" (software-generated) on the pertinent quantitation reports. All "M" flags have been dated and initialed by the analyst performing the integration. In addition, all "M" flags have been reviewed and approved by the GC/MS supervisor. Copies of each manual integration are included in the pertinent quantitation reports.

No other protocol deviations were noted by the volatile organics staff.

Semivolatile Organics Extraction and Analysis

Sixteen aqueous samples were received by Katahdin Analytical Services laboratory on July 27, 1999 for analysis in accordance with 8270C for a client specified PAH list of analytes.

Extraction of the samples occurred following USEPA method 3510 on July 28, 1999. A laboratory control spike/laboratory control spike duplicate pair, consisting of all PAH analytes spiked into organic free water, was extracted in the batch.

The initial calibration curve analyzed in this SDG had some of the target analyte %RSD values exceeding 15 %.

Method 8000B, section 7.5.1.2.1 (Revision 2, 12/96) states, "in those instances where the RSD for one or more analytes exceeds 20%, the initial calibration curve may still be acceptable if the mean of the RSD values for all analytes in the calibration is less than or equal to 20%." Section 7.3.7.1 of method 8270C (revision 3, 12/96) narrows this 20% maximum to 15%.

In the calibration curve analyzed in this SDG, the average %RSD for all analytes was 10.1%, making the curve acceptable.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" by the data system. All manual integrations have been dated and initialed by the responsible analyst. Copies of each manual integration are included in the data package. All manual integrations have been reviewed and approved by the GC/MS supervisor.

Wet Chemistry Analysis

Samples for work order WP3395 were analyzed for nitrate and sulfate in accordance with "Methods for Chemical Analysis of Water and Wastes", EPA 600/4-79-020, 1979, Revised 1983. No deviations were noted by the Wet Chemistry group.

KATAHDIN ANALYTICAL SERVICES, INC.

SAMPLE RECEIPT CONDITION REPORT

Tel. (207) 874-2400

Fax (207) 775-4029

LAB (WORK ORDER) # WP 3395PAGE: 1 OF 4COOLER: 1 OF 4COC# ---SDG# ---DATE / TIME RECEIVED: 7-27-99 0850DELIVERED BY: FedExRECEIVED BY: SALIMS ENTRY BY: SALIMS REVIEW BY / PM: ATCCLIENT: Tetra TechPROJECT: CNC

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>NO VOAs for 126LM0401</u>	<u>ATC contacted Paul Catligan a was decided that since sample not a final dup - vials can be shared between 2 samples</u>
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>19</u>	
6. SAMPLES RECEIVED AT 4°C +/- 2?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u>	
(ICE) ICE PACKS PRESENT (Y) or N?				(RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:no VOAs for 126LM04011 PAH bottle for each 136LM0301, 136LM0401, 296LM0501 arrived broken (extra volume avail.)

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative added.

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
Tel. (207) 874-2400
Fax (207) 775-4029

LAB (WORK ORDER) # WP 3395

PAGE: 2 OF 4

COOLER: 2 OF 4

COC# ---

SDG# ---

DATE / TIME RECEIVED: 7-27-99 0850

DELIVERED BY: FedEx

RECEIVED BY: San

LIMS ENTRY BY: San

LIMS REVIEW BY / PM: APC

CLIENT: Tetra Tech

PROJECT: CNC

	YES	NO	EXCEPTIONS
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. TEMPERATURE BLANKS PRESENT?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. SAMPLES RECEIVED AT 4°C +/- 2°?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ICE / ICE PACKS PRESENT (Y or N)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. TRIP BLANK PRESENT IN THIS COOLER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A

COMMENTS

RESOLUTION

TEMP BLANK TEMP (°C)= _____

COOLER TEMP (°C)= 5.5 NA

(RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)

13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP NFESC ACOE AFCEE OTHER (STATE OF ORIGIN): _____

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this space and additional sheets if necessary to document samples that are received broken check if required. If samples required pH adjustment, record volume and type of preservative added.

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
Tel. (207) 874-2400
Fax (207) 775-4029

LAB (WORK ORDER) # WP3395

PAGE: 3 OF 4

COOLER: 3 OF 4

COC# —

SDG# —

DATE / TIME RECEIVED: 7-27-99 0850

DELIVERED BY: Fed Ex

RECEIVED BY: Sam

LIMS ENTRY BY: Sam

LIMS REVIEW BY / PM: AJC

CLIENT: Tetra Tech

PROJECT: CNC

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>3.0</u>	
6. SAMPLES RECEIVED AT 4°C +/- 2?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u>	
<u>ICE</u> ICE PACKS PRESENT <u>Y</u> or N?				(RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative added.

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
Tel. (207) 874-2400
Fax (207) 775-4029

LAB (WORK ORDER) # WP3395

PAGE: 4 OF 4

COOLER: 4 OF 4

COC# —

SDG# —

DATE / TIME RECEIVED: 7-27-99 0850

DELIVERED BY: Fed Ex

RECEIVED BY: Saw

LIMS ENTRY BY: Saw

LIMS REVIEW BY / PM: ACL

CLIENT: Tetra Tech

PROJECT: CNC

	YES	NO	EXCEPTIONS
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. SAMPLES RECEIVED AT 4°C +/- 2?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(ICE) ICE PACKS PRESENT (Y) or N?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. TRIP BLANK PRESENT IN THIS COOLER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A

COMMENTS

RESOLUTION

TEMP BLANK TEMP (°C) = 2.7

COOLER TEMP (°C) = NA

(RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)

13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP NFESC ACOE AFCEE OTHER (STATE OF ORIGIN):

LOG - IN NOTES⁽¹⁾:

(1) Use this space (and additional sheets if necessary) to document samples that are received broken, if samples required pH adjustment, record volume and type of preservative added.



340 County Road No. 5
P.O. Box 720
Westbrook, ME 04098
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE PRINT IN PEN Page ____ of ____

Client Tetra Tech NUS Inc. Contact _____ Phone # (843) 554-4925 Fax # _____

Address NH-21 Ave H City N. Charleston State S.C. Zip Code 29405

Purchase Order # _____ Proj. Name / No. _____ Katahdin Quote # _____

Bill (if different than above) _____ Address _____

Sampler (Print / Sign) James R. Hill, James R. Hill / Jeff Alexander Copies To: _____

LAB USE ONLY WORK ORDER # WP3395
KATAHDIN PROJECT MANAGER _____

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

REMARKS: _____

SHIPPING INFO: ☒ FED EX ☐ UPS ☐ CLIENT
AIRBILL NO: 813402904554
TEMP °C ☐ TEMP BLANK ☐ INTACT ☐ NOT INTACT

Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
OYON	OYON	OYON	OYON	OYON	OYON	OYON	OYON	OYON	OYON
BTEX, Naph.	MTBE, EDB	PAH	Dissolved Methane	Anions (NO3, PO4)					
12TL00801	24/99/0730	GW	2	2					
12GLM0401	1/1005		5	3	2				
12GLM0401D	1/1005		5	3	2				
12GLM0501	1/1008		5	3	2				
12GLM0701	1/1014		5	3	2				
12GLM0701	1/1223		5	3	2				
13GLM0201	1/1521		5	3	2				
13GLM0201D	1/1521		5	3	2				
13GLM0401	1/1510		5	3	2				
12GLM0101	2/25/99/1205		9	3	2	3	1		
12GLM0201	1/1210		9	3	2	3	1		
12GLM0601	1/1215		9	3	2	3	1		
29GLM0201	2/25/99/1105		5	3	2				
29GLM0401	1/1125		5	3	2				
29GLM0401D	1/1125		5	3	2				
29GLM0501	1/1130		5	3	2				

COMMENTS ZBRL00101 n 1450 5 3 2 RINSATE

Relinquished By: (Signature) <u>[Signature]</u>	Date / Time <u>2/26/99 11:00</u>	Received By: (Signature) <u>[Signature]</u>	Relinquished By: (Signature) _____	Date / Time _____	Received By: (Signature) _____
Relinquished By: (Signature) _____	Date / Time _____	Received By: (Signature) _____	Relinquished By: (Signature) _____	Date / Time <u>7-27-99 0850</u>	Received By: (Signature) <u>[Signature]</u>

KALAMIDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 1

ORDER NO WP-3395

Project Manager: Andrea J. Colby

REPORT TO: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 07/27/99
PHONE: 850/385-98
FAX: 850/385-9865
DUE: 26 AUG
FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
FOSTER PLAZA 7, 661 ANDERSEN DR.
PITTSBURGH, PA 15220

PHONE: 412/921-7090
PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: J. HILL, J. ALEXANDER DELIVERED BY: FEDEX DISPOSE: AFTER 26 AUG

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WP3395-1	12TL00801	24 JUL 0730	27 JUL	AQ

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	1	75.00	75.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2	WP3395-2	12GLM0401	24 JUL 1005	27 JUL	AQ
	WP3395-3	12GLM0401D	24 JUL 1005		
	WP3395-4	12GLM0501	24 JUL 1008		
	WP3395-5	12GLM0301	24 JUL 1014		
	WP3395-6	12GLM0701	24 JUL 1223		
	WP3395-7	13GLM0201	24 JUL 1521		
	WP3395-8	13GLM0201D	24 JUL 1521		
	WP3395-9	13GLM0401	24 JUL 1510		
	WP3395-10	29GLM0201	26 JUL 1105		
	WP3395-11	29GLM0401	26 JUL 1125		
	WP3395-12	29GLM0401D	26 JUL 1125		
	WP3395-13	29GLM0501	26 JUL 1130		
	WP3395-14	ZBRL00101	26 JUL 1450		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	13	75.00	975.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	13	125.00	1625.00

TOTALS		13	200.00	2600.00
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LABORATORY ORDER CONTINUED ON PAGE 2

0890060
08/07/99

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 2

ORDER NO WP-3395

Project Manager: Andrea J. Colby

RT TO: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 07/27/99

PHONE: 850/385-9899

FAX: 850/385-9860

DUE: 26 AUG

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
FOSTER PLAZA 7, 661 ANDERSEN DR.
PITTSBURGH, PA 15220

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: J. HILL, J. ALEXANDER DELIVERED BY: FEDEX DISPOSE: AFTER 26 AUG

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
3	WP3395-15	12GLM0101	25 JUL 1205	27 JUL	AQ
	WP3395-16	12GLM0201	25 JUL 1210		
	WP3395-17	12GLM0601	25 JUL 1215		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	3	75.00	225.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	3	125.00	375.00
Nitrogen, Nitrate (as N)	E300	3	30.00	90.00
Sulfate (as SO4)	E300	3	0.00	0.00
GC Subcontract		3	95.00	285.00
TOTALS		3	325.00	975.00

ORDER NOTE: QC-IV NFESC
DD(KAS007QC-DB3)
CNC CHARLESTON
REPORT COPY: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.
PITTSBURGH, PA 15220
REPORT & DISK

INVOICE: With Report

TOTAL ORDER AMOUNT \$3,650.00

This is NOT an Invoice

AJC/BKR
07-27 Please contact KATAHDIN ANALYTICAL SERVICES promptly if you have any questi

0000061
K1712102



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP3395-10
SDG: WP3395
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/6/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0201	AQ	7/26/99	7/27/99	7/26/99	DS	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	52	%	1.0		
2-FLUOROBIPHENYL	54	%	1.0		
TERPHENYL-D14	86	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3395-10
SDG: WP3395
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/2/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0201	AQ	7/26/99	7/27/99	8/2/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	112	%	1.0		
1,2-DICHLOROETHANE-D4	109	%	1.0		
1,2-DICHLOROETHANE-D8	114	%	1.0		
1,2-DIBROMOFLUOROBENZENE	94	%	1.0		

port Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP3395-11
SDG: WP3395
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/6/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0401	AQ	7/26/99	7/27/99	7/28/99	DS	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	49	%	1.0		
2-FLUOROBIPHENYL	51	%	1.0		
TERPHENYL-D14	78	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3395-11
SDG: WP3395
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/2/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0401	AQ	7/26/99	7/27/99	8/2/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	111	%	1.0		
1,2-DICHLOROETHANE-D4	113	%	1.0		
OLUENE-D8	115	%	1.0		
P-BROMOFLUOROBENZENE	95	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP3395-12
SDG: WP3395
Report Date: 8/26/99
PO No.: N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/6/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0401D	AQ	7/26/99	7/27/99	7/28/99	DS	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	47	%	1.0		
2-FLUOROBIPHENYL	49	%	1.0		
TERPHENYL-D14	76	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3395-12
SDG: WP3395
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/2/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0401D	AQ	7/26/99	7/27/99	8/2/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	116	%	1.0		
1,2-DICHLOROETHANE-D4	115	%	1.0		
1,2-DICHLOROETHANE-D8	112	%	1.0		
p-BROMOFLUOROBENZENE	92	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3395-13
SDG: WP3395
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/6/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0501	AQ	7/26/99	7/27/99	7/28/99	DS	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	44	%	1.0		
2-FLUOROBIPHENYL	48	%	1.0		
TERPHENYL-D14	78	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3395-13
SDG: WP3395
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 7/31/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
29GLM0501	AQ	7/26/99	7/27/99	7/31/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	98	%	1.0		
1,2-DICHLOROETHANE-D4	105	%	1.0		
LUENE-D8	103	%	1.0		
P-BROMOFLUOROBENZENE	101	%	1.0		

Report Notes:

4B
SEMIVOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

SBLK;072899

Lab Name: Katahdin Analytical Services

SDG No.: WP3395

Lab File ID: Z1645

Lab Sample ID: SBLK;072899

Instrument ID: 5972-Z

Date Extracted: 7/28/99

GC Column: RTX-624 ID: 0.18 (mm)

Date Analyzed: 08/05/99

Matrix: (soil/water) WATER

Time Analyzed: 13:28

Level: (low/med) LOW

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCS;072899	LCS;072899	Z1646	8/5/99	2:16:00 PM
LCSD;072899	LCSD;072899	Z1647	8/5/99	3:03:00 PM
12GLM0401	WP3395-2	Z1651	8/5/99	6:09:00 PM
12GLM0401D	WP3395-3	Z1652	8/5/99	6:56:00 PM
12GLM0501	WP3395-4	Z1653	8/5/99	7:43:00 PM
12GLM0301	WP3395-5	Z1656	8/6/99	11:14:00 AM
12GLM0701	WP3395-6	Z1657	8/6/99	12:00:00 PM
13GLM0201	WP3395-7	Z1658	8/6/99	12:45:00 PM
13GLM0201D	WP3395-8	Z1659	8/6/99	1:32:00 PM
29GLM0201	WP3395-10	Z1661	8/6/99	3:04:00 PM
29GLM0401	WP3395-11	Z1662	8/6/99	3:51:00 PM
29GLM0401D	WP3395-12	Z1663	8/6/99	4:38:00 PM
29GLM0501	WP3395-13	Z1664	8/6/99	5:25:00 PM
ZBRL00101	WP3395-14	Z1665	8/6/99	6:13:00 PM
12GLM0101	WP3395-15	Z1666	8/6/99	7:00:00 PM
12GLM0201	WP3395-16	Z1667	8/6/99	7:47:00 PM
12GLM0601	WP3395-17	Z1668	8/6/99	8:35:00 PM
13GLM0401	WP3395-9	Z1676	8/9/99	1:57:00 PM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: SBLK072899
SDG: WP3395
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/5/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
SBLK072899	AQ	-	-	7/28/99	DS	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
NZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	60	%	1.0		
2-FLUOROBIPHENYL	57	%	1.0		
TERPHENYL-D14	78	%	1.0		

Report Notes:

Katahdin Analytical Services

LCS/LCSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
LCS;072899	Z1646	8/5/99	14:16	KRT	AQ	8270
LCSD;072899	Z1647	8/5/99	15:03	KRT	AQ	8270

Compound Name	Spk Amt ug/L	LCS Result ug/L	LCSD Result ug/L	LCS Rec (%)	LCSD Rec (%)	Rec, Limits (%)	RPD (%)	RPD Limit (%)
2-METHYLNAPHTHALENE	50	22.6	33.5	*45	*67	70-130	*39	30
ACENAPHTHENE	50	26.3	35.2	*53	70	70-130	28	30
ACENAPHTHYLENE	50	26.1	35.3	*52	71	70-130	*31	30
ANTHRACENE	50	33.7	40.7	*67	81	70-130	19	30
BENZO[A]ANTHRACENE	50	29.7	36.7	*59	73	70-130	21	30
BENZO[A]PYRENE	50	29.7	35.9	*59	72	70-130	20	30
BENZO[B]FLUORANTHENE	50	27.0	34.3	*54	*69	70-130	24	30
BENZO[G,H,I]PERYLENE	50	28.2	31.5	*56	*63	70-130	12	30
BENZO[K]FLUORANTHENE	50	35.4	42.8	71	86	70-130	19	30
CHRYSENE	50	32.2	37.6	*64	75	70-130	16	30
DIBENZ[A,H]ANTHRACENE	50	26.6	30.0	*53	*60	70-130	12	30
FLUORANTHENE	50	32.0	37.4	*64	75	70-130	16	30
FLUORENE	50	27.3	34.0	*55	*68	70-130	21	30
INDENO[1,2,3-CD]PYRENE	50	24.7	25.8	*49	*52	70-130	5.9	30
NAPHTHALENE	50	21.9	33.3	*44	*67	70-130	*41	30
PHENANTHRENE	50	30.6	38.3	*61	77	70-130	23	30
PYRENE	50	31.7	41.2	*63	82	70-130	26	30

$$RPD = (lcs\ rec - lcsd\ rec) / [(lcsd\ rec + lcsd\ rec) / 2] * 100$$

* Out of Limits

1

0000045

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBKLS02A

Lab Name: Katahdin Analytical Services

SDG No.: WP3395

Lab File ID: S5770

Lab Sample ID: VBKLS02A

Date Analyzed: 08/02/99

Time Analyzed: 9:50

GC Column: RTX-624 ID: 0.18 (mm)

Heated Purge: (Y/N) N

Instrument ID: 5972-S

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCSS02A	LCSS02A	S5769	8/2/99	9:02:00 AM
13GLM0401	WP3395-9	S5771	8/2/99	10:45:00 AM
29GLM0201	WP3395-10	S5772	8/2/99	11:22:00 AM
29GLM0401	WP3395-11	S5773	8/2/99	12:00:00 PM
29GLM0401D	WP3395-12	S5774	8/2/99	12:37:00 PM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKS02A
SDG: WP3395
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/2/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKS02A	AQ	-	-	8/2/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	104	%	1.0		
1,2-DICHLOROETHANE-D4	102	%	1.0		
TOLUENE-D8	112	%	1.0		
P-BROMOFLUOROBENZENE	98	%	1.0		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: S5769

Sample ID: LCSS02A

Date Run: 8/2/99

Analyst: KMC

Time Injected 9:02:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	48.4	97	60-140
BENZENE	50	50.6	101	60-140
ETHYLBENZENE	50	59.4	119	60-140
MTBE	50	52.3	104	60-140
NAPHTHALENE	50	62.6	125	60-140
TOLUENE	50	54.4	109	60-140
TOTAL XYLENES	150	186	124	60-140

*** Out of Limits**

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0000053

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBULKU31A

Lab Name: Katahdin Analytical Services

SDG No.: WP3395

Lab File ID: U0270

Lab Sample ID: VBLKU31A

Date Analyzed: 07/31/99

Time Analyzed: 9:57

GC Column: RTX-624 ID: 0.18 (mm)

Heated Purge: (Y/N) N

Instrument ID: 5973-U

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCSU31A	LCSU31A	U0269	7/31/99	9:21:00 AM
29GLM0501	WP3395-13	U0279	7/31/99	3:25:00 PM
ZBRL00101	WP3395-14	U0280	7/31/99	4:00:00 PM
12GLM0101	WP3395-15	U0281	7/31/99	4:36:00 PM
12GLM0201	WP3395-16	U0282	7/31/99	5:11:00 PM
12GLM0601	WP3395-17	U0283	7/31/99	5:46:00 PM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Owen Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: VBLKU31A
SDG: WP3395
Report Date: 8/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 7/31/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKU31A	AQ	-	-	7/31/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	98	%	1.0		
1,2-DICHLOROETHANE-D4	100	%	1.0		
LUENE-D8	101	%	1.0		
7-BROMOFLUOROBENZENE	99	%	1.0		

Report Notes:

Katabdin Analytical Services
8260 LCS Recovery Sheet

Lab File: U0269

Sample ID: LCSU31A

Date Run: 7/31/99

Analyst: JSS

Time Injected 9:21:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	47.1	94	60-140
BENZENE	50	50.1	100	60-140
ETHYLBENZENE	50	50.6	101	60-140
MTBE	50	45.5	91	60-140
NAPHTHALENE	50	40.3	80	60-140
TOLUENE	50	48.8	98	60-140
TOTAL XYLENES	150	143	95	60-140

*** Out of Limits**

1

0000054

ENSR
Air Toxics Specialty Laboratory
42 Nagog Park
Acton, MA 01720

DATE: August 26, 1999

TO: Andrea Colby
Katahdin Analytical
340 County Road No. 5
P.O. Box 720
Westbrook, ME 04098

Re: Organic Analyses of Aqueous Samples by Gas Chromatography Flame
Ionization Detection (GC/FID)

PROJECT #: **8601-008-200**

LAB ID #: **990123**

ANALYTICAL PROCEDURE:

Three (3) aqueous samples were analyzed under the guidelines of EPA SW846 Method 3810.

A Hewlett Packard 5890 series II gas chromatograph (GC) equipped with a Hewlett Packard flame ionization detector (FID) was used for the analysis. A 1.0 mL headspace aliquot of each sample was injected into the column for analysis. The operating conditions of the GC/FID are listed in Table 1. A five point calibration was performed for the target analytes (methane, ethane, and ethylene).

No problems occurred during sample receipt or log-in.

QUALITY CONTROL:

1. A laboratory blank was analyzed daily in the same manner as the samples. Target analytes were not detected in the blank.
2. A Matrix Spike/MSD was performed on the following sample:
WP3417-7

All recoveries were within QC limits.

Date Samples Received by the Laboratory: 7/28/99

Date Analysis Started: 8/4/99

C:\My Documents\katrpt10.doc

SAMPLE LOG-IN & RECEIPT CHECKLIST

Client/Proj #: Katahdin WP 3417 / 8601-008-200

Proj Mgr: M. Hoyt

Lab Pool #: 990123

Inspected & Logged in by: A MacDuff

Date Time: 7/29/99 1015

Sample Matrix	Number of Samples	Analysis Requested	Analyze by (date)	Storage Location
Aqueous	3	mee	8/25/99	R1

Circle the appropriate response:

- 1) ☒ Shipped ☐ Hand delivered
- 2) COC ☒ present / ☐ not present on receipt
- 3) COC Tape ☒ present / ☐ not present on shipping container
- 4) Samples broken / ☒ intact on receipt
- 5) Samples ambient / ☒ chilled on receipt Temp blank = 5°C
- 6) Samples preserved ☒ correctly / ☐ incorrectly / none recommended
- 7) Received ☒ within / ☐ outside holding time
- 8) COC tapes present / not present on samples
- 9) Discrepancies / NO discrepancies noted between COCs and samples

Additional Comments: 3 VORTs per sample

Andrea Colby

CHAIN of CUSTODY

PLEASE PRINT IN PEN

Page of

Client	KATZALIN ANALYTICAL SERVICES	Contact	ANDREW COLBY	Phone #	()	Fax #	()
Address	SEE ME AT ABOVE	City		State		Zip Code	

Purchase Order #	Proj. Name / No.	Katahdin Quote #
------------------	------------------	------------------

Bill (if different than above)	Address
--------------------------------	---------

Sampler (Print / Sign)	Copies To:
------------------------	------------

LAB USE ONLY	WORK ORDER #:	ANALYSIS AND CONTAINER TYPE											
		PRESERVATIVES											

[illegible][illegible]

SHIPPING INFO:		<input checked="" type="checkbox"/> FED EX	<input type="checkbox"/> UPS	<input type="checkbox"/> CLIENT										
AIRBILL NO:														

[illegible][illegible]

COMMENTS: 22. 44. NEEK (KAS 203 AC - D23) Results Due: 8-7-99

Relinquished By: (Signature) <i>[Signature]</i>	Date / Time 7-28-99 1445	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

WP3417-1(H)

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: 990123-1

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ KTH_028 _____

Level: (low/med) _____ low _____

Date Received: _____ 7/29/99 _____

% Moisture: _____ NA _____

Date Analyzed: _____ 8/4/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (μl)

Soil Aliquot Volume: _____ NA _____ (μl)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(μg/L or PPMv) _____ μg/L _____

Q

74-82-8	Methane	5.2	U
74-85-1	Ethene	9.0	U
74-84-0	Ethane	9.6	U

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

WP3417-2(H)

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: 990123-2

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ KTH_029 _____

Level: (low/med) _____ low _____

Date Received: _____ 7/29/99 _____

% Moisture: _____ NA _____

Date Analyzed: _____ 8/4/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (µl)

Soil Aliquot Volume: _____ NA _____ (µl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(µg/L or PPMv) _____ µg/L _____

Q

74-82-8	Methane	5.2	U
74-85-1	Ethene	9.0	U
74-84-0	Ethane	9.6	U

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

WP3417-7(C)

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: 990123-3

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ KTH_030 _____

Level: (low/med) _____ low _____

Date Received: _____ 7/29/99 _____

% Moisture: _____ NA _____

Date Analyzed: _____ 8/4/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (μl)

Soil Aliquot Volume: _____ NA _____ (μl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(μg/L or PPMv) _____ μg/L _____

Q

74-82-8

Methane

5.2

U

74-85-1

Ethene

9.0

U

74-84-0

Ethane

9.6

U

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

VBK01

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: MB990123

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ KTH_026 _____

Level: (low/med) _____ low _____

Date Received: _____ NA _____

% Moisture: _____ NA _____

Date Analyzed: _____ 8/4/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (μl)

Soil Aliquot Volume: _____ NA _____ (μl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(μg/L or PPMv) _____ μg/L _____

Q

74-82-8	Methane	5.2	U
74-85-1	Ethene	9.0	U
74-84-0	Ethane	9.6	U

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. _____

Lab Name: _____ ENSR _____ Contract: _____

LCS01

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: LCS990123

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ KTH_027 _____

Level: (low/med) _____ low _____

Date Received: _____ NA _____

% Moisture: _____ NA _____

Date Analyzed: _____ 8/4/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (μl)

Soil Aliquot Volume: _____ NA _____ (μl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(μg/L or PPMv) _____ μg/L _____

Q

74-82-8	Methane	38	
74-85-1	Ethene	66	
74-84-0	Ethane	70	

ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

WP3417-7(A)MS

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: 990123-3 MS

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: ___KTH_031_____

Level: (low/med) _____ low _____

Date Received: ___7/29/99_____

% Moisture: _____ NA _____

Date Analyzed: ___8/4/99_____

GC Column: _ Carboxen 1004 _ OD: ___ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (µl)

Soil Aliquot Volume: _____ NA _____ (µl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(µg/L or PPMv) ___ µg/L ___

Q

74-82-8	Methane	370	
74-85-1	Ethene	620	
74-84-0	Ethane	690	

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

WP3417-7(B) MSD

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: 990123-3 MSD

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: __KTH_032_____

Level: (low/med) _____ low _____

Date Received: __7/29/99_____

% Moisture: _____ NA _____

Date Analyzed: __8/4/99_____

GC Column: _ Carboxen 1004 _ OD: __ 1/16" __

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (µl)

Soil Aliquot Volume: _____ NA _____ (µl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(µg/L or PPMv) __ µg/L __

Q

74-82-8

Methane

280

74-85-1

Ethene

480

74-84-0

Ethane

530

4
METHOD BLANK SUMMARY

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

VBLK01

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Lab File ID: _____ KTH_026 _____

Lab Sample I MB990123

Instrument ID: _____ HPGC#3 _____

Date Analyzed: 8/4/99 _____

Matrix: (soil/water) _____ water _____

Level: (low/med) _____ low _____

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES; MS AND MSD

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
01	LCS01	LCS990123	KTH_027	08/04/99
02	WP3417-1(H)	990123-1	KTH_028	08/04/99
03	WP3417-2(H)	990123-2	KTH_029	08/04/99
04	WP3417-7(C)	990123-3	KTH_030	08/04/99
05	WP3417-7(A) MS	990123-3 MS	KTH_031	08/04/99
06	WP3417-7(B) MSD	990123-3 MSD	KTH_032	08/04/99
07				
08				
09				
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18				
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21				
22				
23				
24				
25				
26				

COMMENTS:

LABORATORY CONTROL SPIKE RECOVERY

Lab Name: _____ ENSR _____ Contract: _____

Lab Code: _____ Case NO.: _____ SAS NO.: _____ SDG NO.: _____

Laboratory Control Sample No: _____ LCS01 _____

COMPOUND	SPIKE ADDED (µg/L)	LCS CONCENTRATION (µg/L)	LCS % REC #	QC LIMITS REC.
Methane	41.03	38.28	93%	50 - 150
Ethene	71.04	65.55	92%	50 - 150
Ethane	77.69	70.18	90%	50 - 150

* - Values outside of QC limits.

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ____ ENSR _____

Contract: _____

Lab Code: _____ Case NO.: _____ SAS NO.: _____ SDG NO.: _____

Matrix Spike - EPA Sample NO.: __WP3417-7 _____

COMPOUND	SPIKE ADDED (µg/L)	SAMPLE CONCENTRATION (µg/L)	MS CONCENTRATION (µg/L)	MS % REC #	QC LIMITS REC.
Methane	410.3	0	371.8	91%	50-150
Ethene	710.4	0	624.4	88%	50-150
Ethane	777.0	0	689.1	89%	50-150

COMPOUND	SPIKE ADDED (µg/L)	MSD CONCENTRATION (µg/L)	MSD % REC #	% RPD #	QC LIMITS RPD	REC.
Methane	410.3	283.9	69%	27%	50	50-150
Ethene	710.4	484.5	68%	25%	50	50-150
Ethane	777.0	530.4	68%	26%	50	50-150

Spike recovery: ____ 0 ____ out of ____ 6 ____ outside limits.

RPD: ____ 0 ____ out of ____ 3 ____ outside limits.

Comments:

APPENDIX E

BORING LOG OF MONITORING WELL USED IN AQUIFER CHARACTERIZATION EVALUATION

EnSafe/Allen & Hoshall

Monitoring Well NBCC047006

Project: Zone C - Naval Base Charleston

Coordinates: 2315164.71E, 377240.48 N

Location: Charleston, SC

Surface Elevation: 9.8 feet msl

Started at 1330 on 4-5-95

TOC Elevation: 12.27 feet msl

Completed at 1445 on 4-5-95

Depth to Groundwater: 7.53 feet TOC Measured: 6-21-95

Drilling Method: 4.25" ID (7.5" OD) HSA with split spoon

Groundwater Elevation: 4.74 feet msl

Drilling Company: Alliance Environmental

Total Well Depth: 121 feet bgs

Geologist: Peter Bayley

Well Screen: 21 to 121 feet bgs

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
								Surface conditions: soil and grass		
5			1	37	0		SP	Sand: brown to dark gray, very fine to fine with some medium, trace of silt, soft, wet at 3.5'.	6.8 6.1	
10			2	0	0		SP	Sand: gray with orange FeOx banding in upper 3", very fine to fine with trace medium, trace silt, soft, wet; more brown in upper 5".	2	
			3	75	0				17	
15			4	37	0		SP	Sand: brown to dark brown, very fine to fine, trace silt, soft, wet, some granule to pebbly layer at 13.2-13.4'.	32 39	
20										

APPENDIX F

**DOMENICO 10 YEAR AND 20 YEAR SIMULATION SPREADSHEETS
AND RAOULT'S LAW**

SITE 29, BUILDING NH46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

DOMENICO'S DILUTION/ATTENUATION EQUATION FOR GROUNDWATER TRANSPORT

Predicted 10-year Migration of Constituents in Groundwater

Parameter Descriptions:	Units	Parameter Descriptions:	Units
POE = Point of Exposure		ρ_b = Soil Bulk Density	g/cm ³
SSTL = Site-Specific Target Level	mg/L	f_{oc} = Fraction Organic Carbon in Soil	g-C/g-soil
SSTL _{SOURCE} = Hydrocarbon Concentration in Plume Source Area protective of RBSLs at POE	mg/L	α_x = Longitudinal Dispersivity = $x/10$	m
SSTL _{COMP} = Hydrocarbon Concentration at Compliance Point protective of RBSLs at POE	mg/L	α_y = Transverse Dispersivity = $y/3$	m
X_{POE} = x = Distance from Plume Source to POE (along Centerline)	m	α_z = Vertical Dispersivity = $z/20$	m
X_{COMP} = x = Distance from POE to Compliance Point (along Centerline)	m	k_{oc} = Organic Carbon Partition Coefficient	cm ³ -H ₂ O/g-C
Y = Source Width (Perpendicular to Flow Direction)	m	k_D = Soil-Water Sorption Coefficient	cm ³ -H ₂ O/g-soil
Z = Source Depth (Perpendicular to Flow Direction in Vertical Plane)	m	V = Pore Water Velocity	m/sec
K_s = Saturated Hydraulic Conductivity	m/sec	R_c = Constituent Retardation Factor	
I = Groundwater Gradient	cm/cm	V/R_c = Maximum Transport Rate of Dissolved Constituent = $(K_s I)/(\theta R_c)$	m/sec
θ = Porosity in Saturated Zone	cm ³ /cm ³	RBSL = Risk-Based Screening Level in Water Provided by SCDHEC (1998)	mg/L

Dilution & Attenuation without Biological Decay

Constituent	X_{POE} ft	X_{POE} m	Y m	Z m	t sec	K_s m/sec	I m/m	θ m ³ /cm ³	ρ_b g/cm ³	α_x m	α_y m	α_z m	f_{oc} g-C/g-soil	k_{oc} cm ³ -H ₂ O/g-C	k_D cm ³ -H ₂ O/g-soil	V m/sec	R_c	C_{POE}/C_{SOURCE}
Benzene	430	131.066	15	2	3.15E+08	1.43E-05	0.0555	0.47	1.45	13.11	4.37	0.66	6.78E-03	81	0.54918	1.69E-06	2.694	1.752E-02
Toluene	127.15	38.7558	15	2	3.15E+08	1.43E-05	0.0555	0.47	1.45	3.88	1.29	0.19	6.78E-03	133	0.90174	1.69E-06	3.782	2.152E-01
Naphthalene	186	50.5974	15	2	3.15E+08	1.43E-05	0.0555	0.47	1.45	5.06	1.69	0.25	6.78E-03	1543	10.46154	1.69E-06	33.275	4.432E-04

Source: South Carolina Department of Health and Environmental Control (SCDHEC) 1998. Risk-Based Corrective Action for Petroleum Releases, Bureau of Underground Storage Tank Management.

DOMENICO DILUTION/ATTENUATION MODEL WITHOUT BIOLOGICAL DECAY

$$\frac{C_x}{C_{SOURCE}} = \frac{1}{2} \operatorname{erfc} \left[\frac{\left(x - \frac{vt}{R_c} \right)}{2 \sqrt{\alpha_x \frac{vt}{R_c}}} \right] \times \operatorname{erf} \left[\frac{Y}{4 \sqrt{\alpha_y x}} \right] \times \operatorname{erf} \left[\frac{Z}{2 \sqrt{\alpha_z x}} \right]$$

Constituent	C_{SOURCE} mg/L	C_x mg/L
Benzene	0.313	0.005
Toluene	4.646	1.000
Naphthalene	23.350	0.010

Prepared By: Renata D. Ayers

Reviewed By: Paul E. Caffi

SITE 29, BUILDING NH46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Predicted Migration 20

DOMENICO'S DILUTION/ATTENUATION EQUATION FOR GROUNDWATER TRANSPORT

Predicted 20-year Migration of Constituents in Groundwater

Parameter Descriptions:	Units	Parameter Descriptions:	Units
POE = Point of Exposure		ρ_s = Soil Bulk Density	g/cm ³
SSTL = Site-Specific Target Level		f_{oc} = Fraction Organic Carbon in Soil	g-C/g-soil
SSTL _{SOURCE} = Hydrocarbon Concentration in Plume Source Area protective of RBSLs at POE	mg/L	α_x = Longitudinal Dispersivity = $x/10$	m
SSTL _{COMP} = Hydrocarbon Concentration at Compliance Point protective of RBSLs at POE	mg/L	α_y = Transverse Dispersivity = $\alpha_x/3$	m
X _{POE} = X = Distance from Plume Source to POE (along Centerline)	m	α_z = Vertical Dispersivity = $\alpha_x/20$	m
X _{COMP} = X = Distance from POE to Compliance Point (along Centerline)	m	k_{oc} = Organic Carbon Partition Coefficient	cm ³ -H ₂ O/g-C
Y = Source Width (Perpendicular to Flow Direction)	m	k_o = Soil-Water Sorption Coefficient	cm ³ -H ₂ O/g-soil
Z = Source Depth (Perpendicular to Flow Direction in Vertical Plane)	m	V = Pore Water Velocity	m/sec
K _s = Saturated Hydraulic Conductivity	m/sec	R _c = Constituent Retardation Factor	
I = Groundwater Gradient	cm/cm	V/R _c = Maximum Transport Rate of Dissolved Constituent = (K _s I)/(θR _c)	m/sec
θ = Porosity in Saturated Zone	cm ³ /cm ³	RBSL = Risk-Based Screening Level in Water Provided by SCDHEC (1998)	mg/L

Dilution & Attenuation without Biological Decay

Constituent	X _{POE}	X _{POE}	Y	Z	t	K _s	I	θ	ρ _s	α _x	α _y	α _z	f _{oc}	k _{oc}	k _o	V	R _c	C _{POE} /C _{SOURCE}
	ft	m	m	m	sec	m/sec	m/m	m ³ /cm	g/cm ³	m	m	m	g-C/g-soil	cm ³ -H ₂ O/g-C	cm ³ -H ₂ O/g-soil	m/sec		
Benzene	472	143.867	15	2	6.31E+08	1.43E-05	0.0555	0.47	1.45	14.39	4.80	0.72	6.78E-03	81	0.54918	1.69E-06	2.694	1.753E-02
Toluene	127.2	38.771	15	2	6.31E+08	1.43E-05	0.0555	0.47	1.45	3.88	1.29	0.19	6.78E-03	133	0.90174	1.69E-06	3.782	2.153E-01
Naphthalene	288	87.7835	15	2	6.31E+08	1.43E-05	0.0555	0.47	1.45	8.78	2.93	0.44	6.78E-03	1543	10.48154	1.69E-08	33.275	4.400E-04

Source: South Carolina Department of Health and Environmental Control (SCDHEC) 1998. *Risk-Based Corrective Action for Petroleum Releases*, Bureau of Underground Storage Tank Management.

DOMENICO DILUTION/ATTENUATION MODEL WITHOUT BIOLOGICAL DECAY

Constituent	C _{SOURCE}	C _x
	mg/L	mg/L
Benzene	0.313	0.005
Toluene	4.646	1.000
Naphthalene	23.346	0.010

$$\frac{C_x}{C_{SOURCE}} = \frac{1}{2} \operatorname{erfc} \left[\frac{\left(x - \frac{vt}{R_c} \right)}{2 \sqrt{\alpha_x \frac{vt}{R_c}}} \right] \times \operatorname{erf} \left[\frac{Y}{4 \sqrt{\alpha_y x}} \right] \times \operatorname{erf} \left[\frac{Z}{2 \sqrt{\alpha_z x}} \right]$$

Prepared By:

Renald D. Lopez

Reviewed By:

Paul E. Caffrey

SITE 29, BUILDING NH46
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

HYDROCARBON CONSTITUENT CONCENTRATIONS IN WATER BASED ON RAOULT'S LAW

Parameter Descriptions:

Units

C_W = Aqueous Solubility of Organic Constituents Dissolved from Product	mg/L
C_F = Concentration of the Constituent in the Fuel Oil	mg/L
K_{FW} = Fuel/Water Partition Coefficient	
P_F = Density of Fuel Oil	g/mL
MW_F = Molecular Weight of Fuel Oil	g/mol
C_{SAT} = Aqueous Solubility of the Pure Phase Constituent	mol/L
MW_C = Molecular Weight of the Constituent	g/mol
$K_{FW} = (10^3(\text{mL/L}) P_F) / (MW_F * C_{SAT} / (1000 * MW_C))$	
$C_W = C_F / K_{FW}$	mg/L

Source: "Solubility, Sorption, and Transport of Hydrophobic Organic Chemicals in Complex Mixtures," EPA Environmental Research Brief, EPA/600/M-91/009, Robert S. Kerr Environmental Research Laboratory, ADA, Oklahoma.

Source: "CONCAWE 1996 Diesel Fuel/Kerosene" Conoco, Inc., Houston Texas

Key Assumptions:

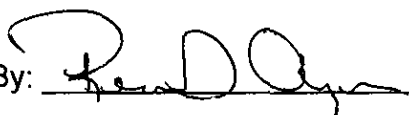
MW_F : Molecular Weight of Kerosene, Source: "CONCAWE 1996 Diesel Fuel/Kerosene" Conoco Inc., Houston Texas. 170 g/mol

P_F : Density of the Product, Source: Conoco Material Safety Data Sheet for Diesel fuel/ Kerosene 0.88 g/mL

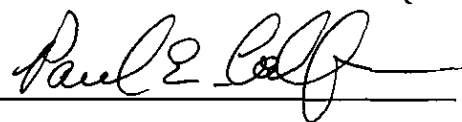
Concentration of Chemical Constituents in Water Based on Molar Solubility

Constituent	MW_F g/mol	C_{SAT} mg/L	MW_C g/mol	P_F g/mL	K_{FW}	C_F mg/L	C_W mg/L
Benzene	170.00	1,750	78	0.88	230.72	72.16	0.31
Toluene	170.00	535	92	0.88	890.16	4,136.00	4.65
Ethylbenzene	170.00	152	106	0.88	3609.91	378.40	0.10
Xylene	170.00	198	106	0.88	2771.24	2,200.00	0.79
Napthalene	170.00	40	128.16	0.88	16585.41	387,200.00	23.35

Prepared By:



Reviewed By:



APPENDIX G

SITE-SPECIFIC RBSL CALCULATIONS

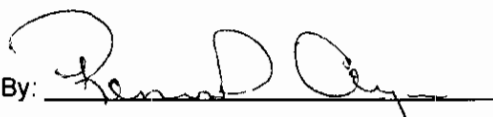
Construction Worker Dermal RBSLs

	Kow	MW	Kp	B	τ_{event}	c	b	t*	t_{event}	DAevent
			cm/hr	unitless	hr/event			hr	hr/event	
Benzene	199.5262315	78.1	0.11551543	0.392637855	2.87E-01	6.32E-01	6.03E-01	6.90E-01	1	eq 3.3
Toluene	537.0317964	92.1	0.259561335	0.958068292	3.44E-01	1.13E+00	1.31E+00	1.33E+00	1	eq 3.2
Ethylbenzene	1412.537545	106.2	0.569219802	2.256154884	4.13E-01	2.36E+00	4.39E+00	1.70E+00	1	eq 3.2
Xylene*	1584.893192	106.2	0.638675123	2.531447415	4.13E-01	2.63E+00	5.31E+00	1.72E+00	1	eq 3.2
Naphthalene	1995.262315	128.2	0.605452393	2.636638957	5.48E-01	2.73E+00	5.69E+00	2.29E+00	1	eq 3.2

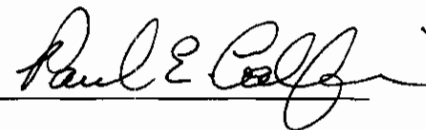
	BW	AT	EV	ED	EF	SA	CSF derm	Rfd derm	Target	RBSL	RBSL
	kg	day	events/day	yrs	days/yr	cm ²	(mg/kg-day) ⁻¹	mg/kg-day	Risk or HQ	mg/L	mg/L
Benzene	70	25550	1	1	90	4500	2.99E-02	NA	1.00E-06		8.52E-01
Toluene	70	365	1	1	90	4500	NA	1.60E-01	1.0	2.40E+01	
Ethylbenzene	70	365	1	1	90	4500	NA	9.70E-02	1.0	6.05E+00	
Xylene*	70	365	1	1	90	4500	NA	1.84E+00	1.0	1.02E+02	
Naphthalene	70	365	1	1	90	4500	NA	3.20E-02	1.0	1.63E+00	

* Kow and MW values for xylene, m-

Prepared By:



Reviewed By:



Construction Worker Incidental Ingestion RBSLs

	BW	AT	IR	ED	EF	Target	CSF oral	Rfd oral	RBSL
	kg	day	L/day	yrs	days/yr	Risk or HQ			mg/L
Benzene	70	25550	0.01	1	90	1.00E-06	2.90E-02		6.85E+01
Toluene	70	365	0.01	1	90	1.0	NA	2.00E-01	5677.778
Ethylbenzene	70	365	0.01	1	90	1.0	NA	1.00E-01	2838.889
Xylene	70	365	0.01	1	90	1.0	NA	2.00E+00	56777.78
Naphthalene	70	365	0.01	1	90	1.0	NA	4.00E-02	1135.556

Prepared By: 

Reviewed By: 

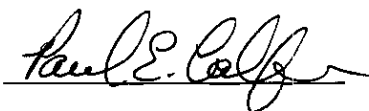
Construction Worker Inhalation RBSLs

Chemical	TR (carc)	HI (nonc)	BWadult	AT	Sfi (carc)	RfD (nonc)	IR air	EF	ED	RBSLair	H	RBSLwater
			kg	yr	[mg/kg-day] ⁻¹	[mg/kg-day]	m ³ /day	day/yr	yr	mg/m ³	cm ³ /cm ³	mg/L
Benzene	1.00E-06	NA	70	70	2.90E-02	NA	20	90	1	3.43E-02	2.26E-01	0.152
Toluene	NA	1	70	1	NA	1.10E-01	20	90	1	1.56E+00	3.01E-01	5.187
Ethylbenzene	NA	1	70	1	NA	2.90E-01	20	90	1	4.12E+00	2.80E-01	14.701
Xylenes	NA	1	70	1	NA	2	20	90	1	2.84E+01	2.78E-01	102.118
Naphthalene	NA	1	70	1	NA	3.71E-04	20	90	1	5.27E-03	2.00E-03	2.633

Prepared By:



Reviewed By:



Minimum Construction Worker RBSLs

	Dermal	Incidental Ingestion	Inhalation	Minimum
	RBSL	RBSL	RBSL	RBSL
	mg/L	mg/L	mg/L	mg/L
Benzene	0.85	68.52	0.15	0.15
Toluene	23.98	5677.78	5.19	5.19
Ethylbenzene	6.05	2838.89	14.70	6.05
Xylene	102.33	56777.78	102.12	102.12
Naphthalene	1.63	1135.56	2.63	1.63

Prepared By: Paul E. Caffrey

Reviewed By: Paul E. Caffrey

APPENDIX H

SOIL LEACHABILITY MODEL

IN-SITU SOIL RISK EVALUATION

SOUTH CAROLINA

Department of Health and Environmental Control (DHEC)

Site Data

SITE ID # _____ COUNTY Charleston
 FACILITY NAME Site 29, Building NH 46
 STREET ADDRESS Charleston Naval Complex, North Charleston, SC

Soil Risk Evaluation Data

			Figure
TPH	<u>9150</u> mg/kg		
Soil % SAND (Estimated)	<u>97.8</u> %		
Soil % CLAY (Estimated)	<u>1</u> %		
Worst Case	Benzene	<u>0.6</u> mg/kg	Cs
Soil Analyses	Toluene	mg/kg	Cs
	Ethylbenzene	<u>3.5</u> mg/kg	Cs
	Xylenes	mg/kg	Cs
	Naphthalene	<u>50.3</u> mg/kg	Cs
	MTBE	mg/kg	Cs
Natural Organic Carbon Content	<u>6780</u> mg/kg	foc	
Average Annual Recharge	<u>25</u> cm	Hw	
Distance from highest Soil Impact to water table	<u>50</u> cm	L	
Bulk Density of Soil	<u>1.45</u> g/cc	Bd	1
Wetting Front Suction	<u>10</u> cm	Hf	2
Soil Hydraulic Conductivity	<u>1.43E-03</u> cm/sec	Kf	3
Porosity	<u>0.47</u> decimal %	Φ	4
Residual Water Content	<u>0.04</u> decimal %	Wr	5

List possible human exposure pathways from surface soil.

Soil leaching to groundwater - utility trench

Bold indicates site specific data

IN-SITU SOIL RISK EVALUATION

SOIL LEACHABILITY MODEL FOR BENZENE

RISK-BASED CORRECTIVE ACTION FOR PETROLEUM RELEASES

SITE INFORMATION:

Site: [REDACTED]
 Location: [REDACTED]

REFERENCES:

- (1) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 1.
- (2) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 2.
- (3) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Input Parameters.
- (4) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 1.
- (5) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 2.
- (6) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 3.
- (7) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 4.
- (8) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 5.

INPUT:

	BENZENE
COC Chemical of Concern	
Bd Soil Bulk Density (1)	g/cm3 1.45
Crsbl Risk Based Screening Level	mg/L 0.15
Cs Concentration of COC in soil	mg/kg 0.6
DAF Dilution/Attenuation Factor (2)	unitless 8
foc Organic Carbon Content in Soil (3)	mg/kg 6780
H' Henry's Law Constant (4)	unitless 0.23
Hf Wetting front suction head (always negative) (5)	cm -10
Hw Average Annual Recharge (3)	cm 25.00
Kf Soil Hydraulic Conductivity (6)	cm/s 1.43E-03
Koc Soil/Water Partitioning Coefficient (2)	ml/g 81
L Depth between soil sample with greatest COC concentration to groundwater.	cm 50
Φ Porosity (7)	unitless 0.47
t1/2 Biodegradation "half life" (2)	days 16
TPH Total Petroleum Hydrocarbons, EPA Method 3550	mg/kg 9150
Wr Residual Water Content (8)	volume fraction 0.04

CALCULATIONS:

Equation Set I - Determine soil pore water concentration resulting from physical partitioning (Cw).

Step 1 - Calculate the total organic carbon content (fcs) of the soil.

$$fcs = (foc + TPH/1.724) * 1E-6 = \underline{0.0121} \text{ decimal \%}$$

Step 2 - Calculate the concentration of COC in soil pore water (Cw) directly in contact with the contaminate soil.

$$Cw = Cs * ((Wr * 1g/cc + Bd) / ((Bd * Koc * fcs) + Wr + ((\theta - Wr) * H))) = \underline{0.5742} \text{ mg/l}$$

Equation Set II - Determine the velocity of the soil pore water (Vw)

Step 1 - Calculate the air filled porosity (f) in decimal percent.

$$f = \theta - Wr = \underline{0.43} \text{ decimal \%}$$

Step 2 - Determine the time for water to percolate through the vadose zone soil (from depth of worst case soil sample to the water table at site).

$$t = (f/Kf) * (L - ((Hw - Hf) * (\ln((Hw + L - Hf) / (Hw - Hf))))) = \underline{5,697} \text{ seconds}$$

Step 3 - Determine the velocity of the water (Vw) in feet per year.

$$Vw = (L/30.48cm/ft) / (t/31,500,000sec/year) = \underline{9,071} \text{ ft/year}$$

Equation Set III - Determine the organic retardation effect (Vc) of the contaminant.

Step 1 - Calculate the soil/water distribution coefficient (Kd) (ml/g) for uncontaminated soil.

$$Kd = Koc * foc * 1E-6 = \underline{0.54918} \text{ ml/g}$$

Step 2 - Calculate the retardation effect of natural soil organic matter on COC migration.

$$Vc = Vw / (1 + ((Bd * Kd) / \theta)) = \underline{3,367} \text{ ft/year}$$

Equation Set IV - Determine biodegradation rates and provide final COC concentration (Cf) at depth of concern.

Step 1 - Calculate the time (Tc) in days required for the COC to reach groundwater.

$$Tc = 365 \text{ day/yr} * ((L/30.48cm/ft) / Vc) = \underline{0.18} \text{ days}$$

Step 2 - Calculate estimated concentration of COC in the soil pore water (Cp) necessary to protect groundwater.

$$Cp = 10^{(\log(Crsbl) + ((Tc/2.3) * (0.693/t^{1/2})))} = \underline{0.1512} \text{ mg/l}$$

COC concentration in soil pore water (Cp) is greater than concentration necessary to protect groundwater (Cwl), therefore the SSTL must be calculated.

Equation Set V - Calculate the Site Specific Target Level (SSTL) for the COC in soil.

$$\text{Cssti for BENZENE in soil} = \text{Cp} * \text{DAF} * (((\text{Bd} * \text{Koc} * \text{fcs}) + \text{Wr} + (\text{F} * \text{'H''})) / (\text{Wr} * 1\text{g/cc} + \text{Bd})) = \underline{\underline{1.263531 \text{ mg/kg}}}$$

PREPARED BY: 

Date

CHECKED BY: 

Date

IN-SITU SOIL RISK EVALUATION**SOUTH CAROLINA**

Department of Health and Environmental Control (DHEC)

Site Data

SITE ID # 0
 FACILITY NAME Site 29, Building NH 46

Instructions

Provide results, separately, for each constituent in the worst case soil analysis.

DataList Constituent: BENZENE

(BTEX, Naph.)

Table

Bioremediation "half-life"	<u>16</u>	days	t 1/2	1
Soil/water partitioning coefficient	<u>81</u>	ml/g	K oc	1

Results

				Equation Set	Step
Total Organic Carbon Content	<u>0.0121</u>	decimal %	f cs	I	1
Leachate Concentration	<u>0.574</u>	mg/l	C w	I	2
Air Filled Porosity	<u>0.43</u>	decimal %	f	II	1
Infiltration Rate Time	<u>5,697</u>	seconds	t	II	2
Velocity of Water	<u>9,071</u>	ft/year	V w	II	3
Soil/Water Distribution Coefficient	<u>0.5492</u>	ml/g	K d	III	1
Contaminant Percolation Rate	<u>3,367</u>	ft/year	V c	III	2
Time to Reach Groundwater	<u>0.18</u>	days	T c	IV	1
Concentration reaching Groundwater	<u>0.1512</u>	mg/l	C p	IV	2
Site Specific Target Level	<u>1.2635</u>	mg/kg	C sstl	V	

ConclusionsDoes concentration of chemical of concern in soil exceed SSTL? NO

Risk of Human Exposure due to contaminated soil.

YESNO

Page 2 of 6 Pages

IN-SITU SOIL RISK EVALUATION

SOIL LEACHABILITY MODEL FOR ETHYLBENZENE

RISK-BASED CORRECTIVE ACTION FOR PETROLEUM RELEASES

SITE INFORMATION:

Site: **Site 29, Building NH 46**
 Location: **Charleston Naval Complex, North Charleston, SC**

REFERENCES:

- (1) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 1.
- (2) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 2.
- (3) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Input Parameters.
- (4) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 1.
- (5) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 2.
- (6) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 3.
- (7) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 4.
- (8) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 5.

INPUT:

	ETHYLBENZENE
COC Chemical of Concern	
Bd Soil Bulk Density (1)	g/cm ³ 1.45
Crsbl Risk Based Screening Level	mg/L 6.05
Cs Concentration of COC in soil	mg/kg 3.5
DAF Dilution/Attenuation Factor (2)	unitless 8
foc Organic Carbon Content in Soil (3)	mg/kg 6780
H' Henry's Law Constant (4)	unitless 0.28
Hf Wetting front suction head (always negative) (5)	cm -10
Hw Average Annual Recharge (3)	cm 25
Kf Soil Hydraulic Conductivity (6)	cm/s 0.0014
Koc Soil/Water Partitioning Coefficient (2)	ml/g 176
L Depth between soil sample with greatest COC concentration to groundwater.	cm 50
Ø Porosity (7)	unitless 0.47
t1/2 Biodegradation "half life" (2)	days 10
TPH Total Petroleum Hydrocarbons, EPA Method 3550	mg/kg 9150
Wr Residual Water Content (8)	volume fraction 0.04

CALCULATIONS:

Equation Set I - Determine soil pore water concentration resulting from physical partitioning (Cw).

Step 1 - Calculate the total organic carbon content (fcs) of the soil.

$$fcs = (foc + TPH/1.724) * 1E-6 = \underline{0.0121} \text{ decimal \%}$$

Step 2 - Calculate the concentration of COC in soil pore water (Cw) directly in contact with the contaminate soil.

$$Cw = Cs * ((Wr * 1g/cc + Bd) / ((Bd * Koc * fcs) + Wr + ((\theta - Wr) * H))) = \underline{0.0625556} \text{ mg/l}$$

Equation Set II - Determine the velocity of the soil pore water (Vw)

Step 1 - Calculate the air filled porosity (f) in decimal percent.

$$f = \theta - Wr = \underline{0.43} \text{ decimal \%}$$

Step 2 - Determine the time for water to percolate through the vadose zone soil (from depth of worst case soil sample to the water table at site).

$$t = (f/Kf) * (L - (Hw - Hf)) * (\ln(Hw / ((L - Hf) / (Hw - Hf)))) = \underline{5,697} \text{ seconds}$$

Step 3 - Determine the velocity of the water (Vw) in feet per year.

$$Vw = (L/30.48cm/ft) / (t/31,500,000sec/year) = \underline{9,071} \text{ ft/year}$$

Equation Set III - Determine the organic retardation effect (Vc) of the contaminant.

Step 1 - Calculate the soil/water distribution coefficient (Kd) (ml/g) for uncontaminated soil.

$$Kd = Koc * foc * 1E-6 = \underline{1.19328} \text{ ml/g}$$

Step 2 - Calculate the retardation effect of natural soil organic matter on COC migration.

$$Vc = Vw * (1 + ((Bd * Kd) / \theta)) = \underline{1,938} \text{ ft/year}$$

Equation Set IV - Determine biodegradation rates and provide final COC concentration (Cf) at depth of concern.

Step 1 - Calculate the time (Tc) in days required for the COC to reach groundwater.

$$T_c = 365 \text{ day/yr} * ((L/30.48\text{cm/ft})/V_c) = \underline{\quad 0.31 \quad} \text{ days}$$

Step 2 - Calculate estimated concentration of COC in the soil pore water (Cp) necessary to protect groundwater.

$$C_p = 10^{(\log(C_{rsbl}) + ((T_c/2.3) * (0.693/t_{1/2})))} = \underline{\quad 6.18 \quad} \text{ mg/l}$$

COC concentration in soil pore water (Cp) is greater than Crsbl, therefore the SSTL must be calculated.

Equation Set V - Calculate the Site Specific Target Level (SSTL) for the COC in soil.

$$C_{sstl} \text{ for THYLBENZENE} = C_p * DAF * (((Bd * Koc * f_{cs}) + W_r + (F * H''')) / (W_r * 1\text{g/cc} + Bd)) = \underline{\underline{107.695903 \text{ mg/kg}}}$$

in soil

PREPARED BY:

Ned H. Goss

Date

CHECKED BY:

Paul E. Goss

Date

IN-SITU SOIL RISK EVALUATION

SOUTH CAROLINA
Department of Health and Environmental Control (DHEC)

Site Data

SITE ID #	0
FACILITY NAME	Site 29, Building NH 46

Instructions

Provide results, separately, for each constituent in the worst case soil analysis.

Data

List Constituent: ETHYLBENZENE
(BTEX, Naphth.)

Bioremediation "half-life"	<u>10</u>	days	t 1/2	1
Soil/water partitioning coefficient	176	ml/g	K oc	1

Results

				Equation Set	Step
Total Organic Carbon Content	0.0121	decimal %	f cs	I	1
Leachate Concentration	6.26E-02	mg/l	C w	I	2
Air Filled Porosity	0.43	decimal %	f	II	1
Infiltration Rate Time	5,697	seconds	t	II	2
Velocity of Water	9,071	ft/year	V w	II	3
Soil/Water Distribution Coefficient	1.1933	ml/g	K d	III	1
Contaminant Percolation Rate	1,938	ft/year	V c	III	2
Time to Reach Groundwater	0	days	T c	IV	1
Concentration reaching Groundwater	6	mg/l	C p	IV	2
Site Specific Target Level	108	mg/kg	C sstl	V	

Conclusions

Does concentration of chemical of concern in soil exceed SSTL? NO

Risk of Human Exposure due to contaminated soil.

YES X NO

IN-SITU SOIL RISK EVALUATION

SOIL LEACHABILITY MODEL FOR NAPHTHALENE

RISK-BASED CORRECTIVE ACTION FOR PETROLEUM RELEASES

SITE INFORMATION:

Site: **Site 29, Building NH 46**
 Location: **Charleston Naval Complex, North Charleston, SC**

REFERENCES:

- (1) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 1.
- (2) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 2.
- (3) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Input Parameters.
- (4) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 1.
- (5) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 2.
- (6) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 3.
- (7) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 4.
- (8) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 5.

INPUT:

	NAPHTHALENE
COC Chemical of Concern	
Bd Soil Bulk Density (1)	g/cm ³ 1.45
Crsbl Risk Based Screening Level	mg/L 1.63
Cs Concentration of COC in soil	mg/kg 50.3
DAF Dilution/Attenuation Factor (2)	unitless B
foc Organic Carbon Content in Soil (3)	mg/kg 6780
H' Henry's Law Constant (4)	unitless 0.002
Hf Wetting front suction head (always negative) (5)	cm -10
Hw Average Annual Recharge (3)	cm 25
Kf Soil Hydraulic Conductivity (6)	cm/s 0.0014
Koc Soil/Water Partitioning Coefficient (2)	ml/g 1543
L Depth between soil sample with greatest COC concentration to groundwater.	cm 50
ø Porosity (7)	unitless 0.47
t1/2 Biodegradation "half life" (2)	days 48
TPH Total Petroleum Hydrocarbons, EPA Method 3550	mg/kg 9150
Wr Residual Water Content (8)	volume fraction 0.04

CALCULATIONS:

Equation Set I - Determine soil pore water concentration resulting from physical partitioning (Cw).

Step 1 - Calculate the total organic carbon content (fcs) of the soil.

$$fcs = (foc + TPH/1.724) * 1E-6 = \underline{0.0121} \text{ decimal \%}$$

Step 2 - Calculate the concentration of COC in soil pore water (Cw) directly in contact with the contaminate soil.

$$Cw = Cs * ((Wr * 1g/cc + Bd) / ((Bd * Koc * fcs) + Wr + ((\theta - Wr) * H))) = \underline{0.11} \text{ mg/l}$$

Equation Set II - Determine the velocity of the soil pore water (Vw)

Step 1 - Calculate the air filled porosity (f) in decimal percent.

$$f = \theta - Wr = \underline{0.43} \text{ decimal \%}$$

Step 2 - Determine the time for water to percolate through the vadose zone soil (from depth of worst case soil sample to the water table at site).

$$t = (f/Kf) * (L - (Hw - Hf)) * (\ln(Hw + ((L - Hf) / (Hw - Hf)))) = \underline{5,697} \text{ seconds}$$

Step 3 - Determine the velocity of the water (Vw) in feet per year.

$$Vw = (L/30.48cm/ft) / (t/31,500,000sec/year) = \underline{9071} \text{ ft/year}$$

Equation Set III - Determine the organic retardation effect (Vc) of the contaminant.

Step 1 - Calculate the soil/water distribution coefficient (Kd) (ml/g) for uncontaminated soil.

$$Kd = Koc * foc * 1E-6 = \underline{10.46154} \text{ ml/g}$$

Step 2 - Calculate the retardation effect of natural soil organic matter on COC migration.

$$Vc = Vw * (1 + ((Bd * Kd) / \theta)) = \underline{273} \text{ ft/year}$$

Equation Set IV - Determine biodegradation rates and provide final COC concentration (Cf) at depth of concern.

Step 1 - Calculate the time (Tc) in days required for the COC to reach groundwater.

$$T_c = 365 \text{ day/yr} * ((L/30.48\text{cm/ft})/V_c) = \underline{\underline{2.20}} \text{ days}$$

Step 2 - Calculate estimated concentration of COC in the soil pore water (Cp) necessary to protect groundwater.

$$C_p = 10^{(\log(C_{rsbl}) + ((T_c/2.3) * (0.693/t_{1/2})))} = \underline{\underline{1.68}} \text{ mg/l}$$

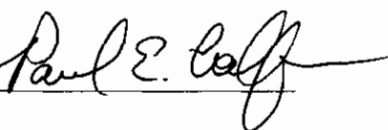
COC concentration in soil pore water (Cp) is greater than Crsbl, therefore the SSTL must be calculated.

Equation Set V - Calculate the Site Specific Target Level (SSTL) for the COC in soil.

$$C_{sstl} \text{ for IAPHTHALENE in soil} = C_p * DAF * (((Bd * K_{oc} * f_{cs}) + W_r + (F * H''')) / (W_r * 1\text{g/cc} + Bd)) = \underline{\underline{244.681950}} \text{ mg/kg}$$

PREPARED BY: 

Date

CHECKED BY: 

Date

IN-SITU SOIL RISK EVALUATION